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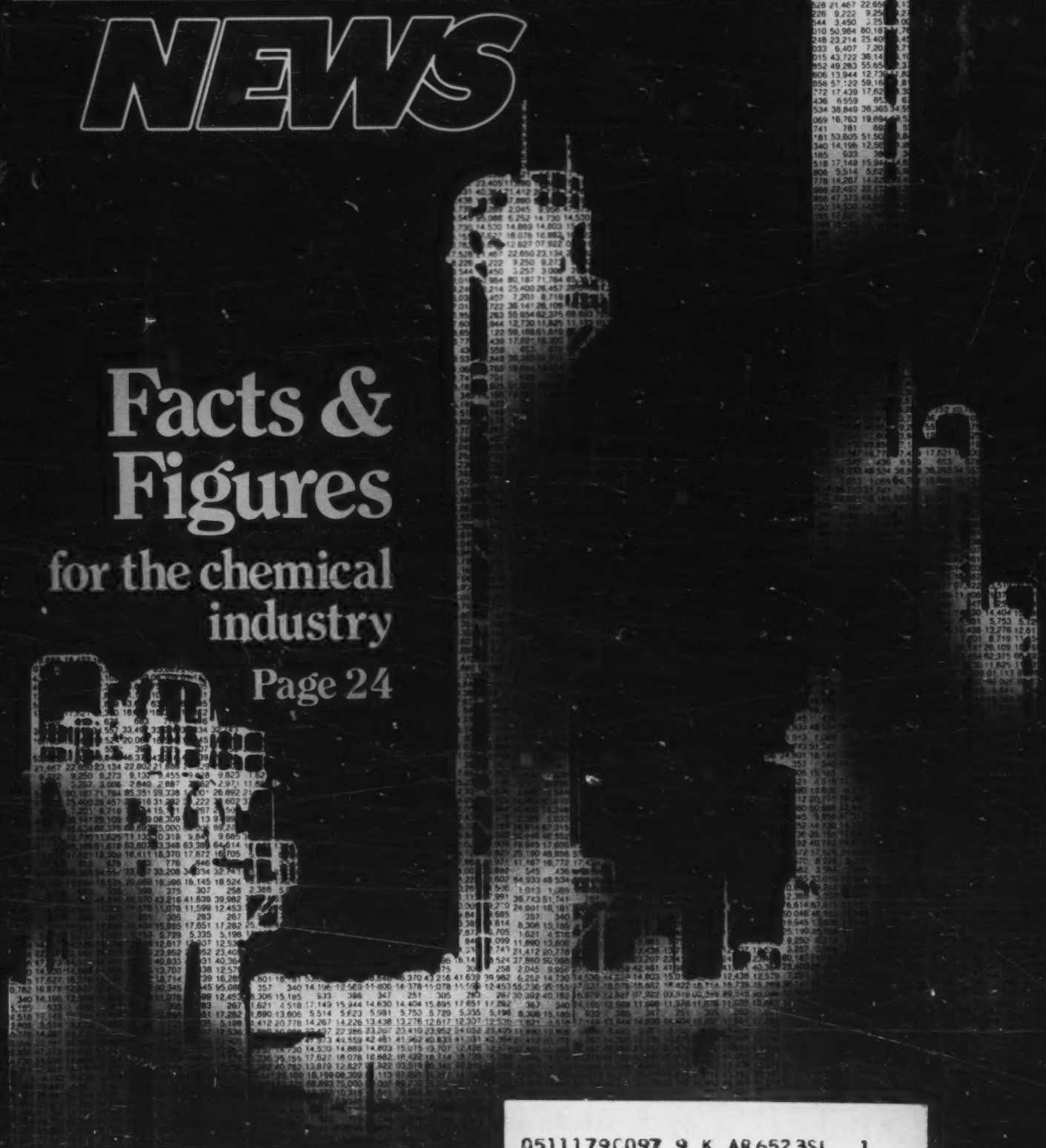

Facts & Figures

for the chemical industry

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CHEMICAL & ENGINEERING
NEWS

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JUNE 8, 1987

News of the Week

■ **At international conference on AIDS, reports ranged from dire predictions of worldwide epidemic to cautiously optimistic results of new treatments.** **Page 6**

■ **An Administration policy on AIDS control and prevention began to take shape last week with proposals, some controversial, for testing certain groups; Congress took steps to promote education about the disease.** **Page 7**

■ **The Sterling Group offers to buy two polyester facilities owned by Celanese Fibers division of Hoechst Celanese.** **Page 7**

■ **FDA panel's recommendation to deny Genentech's request to approve blood clot-dissolving protein TPA until more data were provided had a negative effect on all biotech industry stocks.** **Page 8**

■ **Administration feud over policies to control ozone-depleting chlorofluorocarbons comes to light when Interior Secretary's remarks are leaked to the press.** **Page 8**

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Business

Most leading biotechnology firms show gains in first-quarter revenues and narrowing losses. **Page 11**

Government

NSF reports on Japan's goals for science and technology note emphasis on an environmental, humanistic approach. **Page 13**

Science

The structures of calichemicins and esperamicins, potent new classes of anticancer agents, have been determined. **Page 17**

The Soviet Union has begun a long-term study of the health of those who were closest to the Chernobyl reactor when it exploded. **Page 19**

Technology

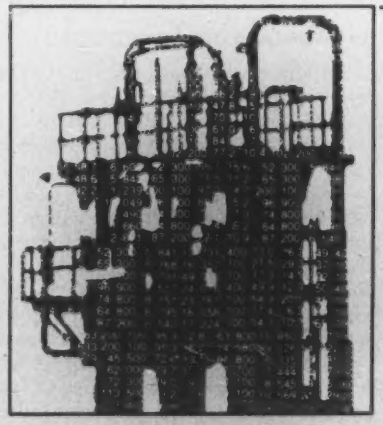
Search for catalytic methods to convert methane to fuel includes, among others, use of heteropoly oxometalates. **Page 20**

Books

"Chemicals and Society: A Guide to the New Chemical Age" does what chemists have failed to do—communicate with the layperson. **Page 77**

ACS News

Petroleum Research Fund grants approved by ACS Board of Directors add $3,468,264 to 1987 funding. **Page 80**



Facts & Figures

The U.S. chemical industry witnessed a steady, but slow, growth in 1986; however, cost-cutting measures of the past few years led to higher earnings. C&EN's annual survey of the industry in the U.S. and abroad gives the latest trends. **Page 24**

Losses Narrow at Most Biotechnology Firms

Revenues increased sharply and, in most instances, losses narrowed at leading biotechnology companies in the first quarter of this year. At some firms, the rise in revenues came from improved product sales, but at others, bigger and more collaborative research agreements are responsible. For many of the 18 companies surveyed by C&EN, this increase in revenues translated in the bottom line to narrow losses and, for several, provided profits.

For the 18 biotechnology companies, revenues in the first quarter increased an average 34% from last year's first quarter to a cumulative $111 million. At the same time, total losses for the entire group rose to $15.3 million from $12.1 million in first-quarter 1986. However, losses at troubled Monoclonal Antibodies were larger than the increase in the cumulative loss. The company lost more than $5.4 million in the first quarter, compared with profits of $181,000 in the same period last year. Excluding Monoclonal Antibodies, the cumulative loss for the group was about $9.9 million, down from $12.2 million in first-quarter 1986.

For the four companies reporting products sales, these rose to a total of $12.5 million, an increase of 51% over the same quarter last year. Perhaps the most important of the four from a financial standpoint was Calgene, whose product sales climbed from zero in what was its second fiscal quarter of 1986 to almost $5 million in the first quarter this year. However, the reason for this rise was not a biotechnology product, but rather sales of cottonseed through Calgene's recently acquired Stoneville Pedigreed Seed Co. subsidiary.

This, along with new product development agreements with Nippon Steel and Procter & Gamble, contributed to the company's first profitable quarter. Calgene's chief financial officer Daniel O. Wagster cautions that the firm's quarterly financial performance now will be affected by the seasonality of the cottonseed subsidiary Stoneville, which is expected to operate at a profit in the company's second and third fiscal quarters and at a loss in the first and fourth quarters. Calgene recorded a profit of $493,000 in the quarter, compared with a loss of $304,000 in the same period last year.

At other companies with product sales, Genentech registered an increase of 126% to $16.5 million and Cetus sales were up 66% to $730,000. Product sales of Molecular Genetics, however, fell 48% to $267,733. According to Molecular Genetics, unit sales volume of Genecol 99 monoclonal antibody for the prevention of calf deaths from *Escherichia coli* scours did not meet expectations because of production difficulties in gearing up manufacturing to build inventory.

Of the 18 companies surveyed, five registered earnings in the first quarter. Amgen had a profit of $232,000, up 13% from the year-earlier quarter; Calgene had earnings of $493,000, compared with a loss in first-quarter 1986; Centocor had earnings of $2.82 million, up 76% from the same quarter in 1986; Genentech had an 84% gain to $3.23 million; and Synergen had earnings of $81,000, down 73% from first-quarter 1986.

The continuing deficits of some companies generally were explained as the result of decisions to invest money for the future. Comments by Gabriel Schmergel, president and chief executive officer of Genetics Institute, which lost $1.31 million in the quarter, were typical: "The losses reflect Genetics Institute's strategic decision to invest prudent levels of equity in the development of products that we can manufacture and bring to market. We will continue to follow this financing strategy until meaningful revenues commence from commercialization of products now in clinical testing."

William Storck, New York

Revenues up at most biotechnology firms

	FIRST-QUARTER 1987					
	Revenues ($ millions)	Earnings	Change from 1986 Sales	Change from 1986 Earnings	Profit margin[a] 1987	Profit margin[a] 1986
Amgen	$10.626	$0.232	55%	13%	2.2%	3.0%
Biogen	3.985	−5.569	4	def	def	def
BioTechnica International	1.592	−1.964	−11	def	def	def
Calgene	7.353	0.493	508	def	6.7	def
California Biotechnology	3.014	−1.583	−7	def	def	def
Centocor	11.952	2.815	64	76	23.6	21.9
Cetus	13.603	−0.946	−9	def	def	2.4
Cytogen	2.518	−0.280	884	def	def	def
Damon Biotech	1.243	−2.162	49	def	def	def
DNA Plant Technology	1.805	−0.065	76	def	def	def
Genentech	38.606	3.231	33	84	8.4	6.0
Genetics Institute	5.271	−1.309	19	def	def	def
Immunex	3.500	−0.311	169	def	def	def
Liposome	0.872	−1.491	41	def	def	def
Molecular Genetics	1.251	−0.907	−15	def	def	0.8
Monoclonal Antibodies	1.553	−5.430	−39	def	def	7.1
Ribi ImmunoChem	0.430	−0.133	9	def	def	9.1
Synergen	2.256	0.081	1	−73	3.6	13.5

[a] Net earnings as a percentage of revenues. def = deficit.

NSF Profiles Japan's Science and Technology Strategy

National Science Foundation reports reflect emphasis by Japan on social, humanistic approach to science and its translation into policy

Wil Lepkowski, C&EN Washington

For the past five years, the National Science Foundation's Tokyo office has been turning out a series of intelligence reports on science and technology trends of America's number one competitor, Japan. Taken together, the reports present a unique running profile of how Japan has changed its strategies to gear its technical machine to the Japanese idea of progress.

Some of the more current reports describe issues such as competition between Japan's two major technical agencies, trends in Japanese financial support of U.S. academic and industrial research, the country's new stress on science and technology to meet mankind's needs, and a directory of selected Japanese scientific research institutes.

Until early this year, the reports were produced more or less for the in-house consumption of NSF. But in January the foundation established a new division of information and analysis with the eventual aim of developing ways of monitoring technical highlights in all the major areas of the world and marketing the results.

The Japanese reports are compiled by a four-person NSF staff in Tokyo headed by Alexander P. DeAngelis. One of the more fascinating of the Japanese reports, memorandum 115, was issued last December describing Japan's 1986 White Paper on Science & Technology.

The current document, issued by Japan's Science & Technology Agency (STA), has the theme "Toward a Better Environment for Man." Essentially, it provides a technology assessment of Japan as a whole through the mid-1980s and describes its vision of the future. Last year the theme was "New Development for R&D and the Era of Cooperation."

Inspiring the theme, according to NSF, is Japan's concern over the "good and evil" effects of technology on people's lives. The evil effects, it says, "are invasion of privacy through electronic means, separation of the individual from the community, spoiling of the natural environment, and the growing gap between increasing reliance on technology and decreasing ability to understand it."

The Japanese appear to be emphasizing the social and humanistic approach by promoting the coming need for "human friendly" science and technology alongside their policy of strengthening basic research. How that is translated into policy and, further, into international commercial markets should be one of the more intriguing questions for today's Japan watchers.

Human beings, the paper says, "have become increasingly aware of the benefits of advancing science and technology in the form of improved medical care, high-tech products, and [better] clothing, food, and shelter. On the other hand, they have begun to realize the drawbacks attendant upon such development, for example, the decline of skill as the price of convenience, and the depersonalization of human relations through mechanization."

So, the paper asks: "What is the level of well-being and the sense of fulfillment people seek in human terms? Although well-being and fulfillment can be achieved through various economic, social, and cultural activities, what are the roles science and technology can play in helping the people achieve these aims?" Some of those questions lay behind a program begun last year by another major Japanese agency, the Ministry of International Trade & Industry. MITI's program, called the "Human Frontier Program," is seen by NSF to be somewhat competitive with STA's "human friendly" enterprise and is aimed at supporting research around the world in "ecology friendly" technology.

Japan says advanced technology today seems to be headed in three separate directions: first, toward increased development of new inorganic materials through research at the molecular level and of new pro-

Japanese science and technology at a glance

Total R&D spending: $59.3 billion in fiscal 1986, ended March 31, 1987 ($1.00 = 150 yen in 1987), up 13% from previous fiscal year

Sources: National and local governments, 21%; private sector, 79%

Ratio to gross national product: 2.8%

Total full-time researchers: 474,000. Breakdown by place of work: private industry, 252,000; research institutes, 37,000; universities, 185,000

Expenditure per researcher: $144,667. Breakdown by place of work: research institutes, $212,000; private industry, $157,333; universities, $64,667

Payment/receipt ratio in international technology trade: 1.25 ($1.95 billion vs. $1.56 billion). 0.35 for transactions initiated only in fiscal 1985

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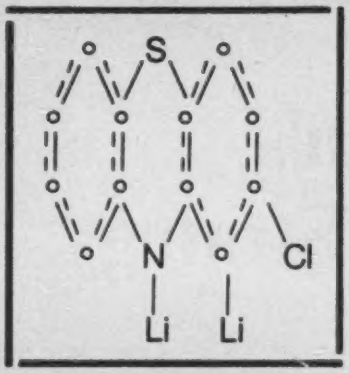

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teins with broad health and agricultural applications. Second, toward integrated-systems approaches to solving most technical problems, from R&D decision making to medical treatment. Third, toward increased bioelectronic technology to enhance and replace body functions.

What all that means, according to today's Japanese futurists, is intensified development of products that "directly touch people's lives." One example is "technologies aimed at enhancing the human sensory mechanisms by the application of high technology, such as computer graphics and holography. In addition, technologies highly responsive to man's psychological and ecological needs are expected to develop in the coming years." What is so fascinating about Japan's science policy language is its contrast to the rhetoric of the U.S. technical establishment with its generalized focus on engineering and competitiveness without much specific reference to human and ecological values.

To take advantage of these trends, the report says that youth must be trained differently. It suggests exposing them to science at increasingly early ages and infusing in them attitudes "receptive to learning from the mechanisms and the working systems of nature and human beings." Thus, "greater efforts to help rear nature-loving and emotionally balanced youngsters will power the development of human-friendly science and technology."

Alongside Japan's vision of the goals for science and technology is its strategy toward international cooperation in technical fields. This policy is embodied in MITI's "Human Frontier Program." But because that program, according to NSF, has been somewhat competitive with STA's Human & Earth Sciences Program, Japan is not speaking with a single policy voice.

Premier Yasuhiro Nakasone was supposed to have proposed an international cooperation plan before the May 1986 summit meeting in Tokyo, but changed his mind when the two agencies couldn't coordinate their proposals. NSF analysts believe that Nakasone could resurrect the proposal during this week's summit meeting in Venice.

In any case, the human frontier initiative does represent a "new paradigm" in technological thinking, according to the NSF analysis, in that it claims that current technology has up to now been antagonistic to nature and needs to be made more harmonious with it. The Japanese thrust calls for "technology for utilizing the functions of living bodies." As NSF explains the terms, MITI "envisions not just another major [science and technology] program, but an actual redirection of technological development away from the prosperity-creating yet destructive physical-mechanical model to a biological model, which MITI hopes and believes will make [society] more a part of the natural order rather than its enemy."

In another paper, NSF attempts to analyze Japanese industrial support of research in American universities. NSF estimates that in 1986 Japanese companies spent about $9.1 million for research at American universities. The amount is minuscule alongside the approximately $10 billion U.S. academic basic research budget. But Japan has swiftly become the world's chief financial power with enormous investments in U.S. industry, banking, and real estate. That wealth is expected to spread to research, according to NSF. Moreover, American universities could begin soliciting such support. Massachusetts Institute of Technology already operates an office in Tokyo, and several other universities have followed suit. About a third of the Japanese companies obtain patent rights from the academic research they support in the U.S.

The NSF analysis concludes that Japanese spending in American universities is growing at a "prodigious" rate. "There is a consensus that more basic research will be needed for input to future industrial development than is available from Japanese [science and technology] resources. It is not surprising, therefore, that Japanese industry should include acquisition of basic research from abroad as part of its strategy to keep at the forefront of scientific and engineering knowledge."

NSF adds that Japanese companies are establishing their own research facilities in the U.S. As of

last fall, 22 had such facilities, and 87 said they were making plans to do so. The trend likely will open up significant employment opportunities for U.S. scientists and engineers, says NSF.

Owens says the U.S. presence in Japan, in the form of technical staff from American industry and academia, remains small—"in the hundreds"—and that the American professionals remain at a disadvantage in their lack of proficiency in the Japanese language.

The "character" of Japanese science and technology policy reflects a "strong moral force" operating in the country as it moves into an intensified area of basic research and human applications. It takes two directions. "If you look at the changes in policy with respect to supporting basic research," Owens says, "you see two elements. One reflects a fear that if the Japanese don't do more research in-house the world may cut them off from new knowledge. The other half of that says Japan is an economically important country and that it behooves it to act responsibly toward the rest of the world in terms of initiating ideas instead of only borrowing them."

Owens is concerned with some U.S. policy tendencies toward restricting the flow of research to Japan. "I think it's a mistake to mix trade matters with those of science and technology," he says. "If we cut off what we share with them, they can cut off what we get. This kind of thinking never gets into trade discussions."

So far, 117 reports on Japan have been produced by NSF's office. Those in the pipeline include a list of new categories of grants in priority areas of research, a description of newly established joint industry-university research centers, and a rundown of superconductivity research being performed at one of the major laboratories funded by STA.

Owens is hoping the reports will be made more widely available to U.S. industry and universities. A pilot program with the State and Commerce departments will be under way shortly to explore ways of including the NSF reports in their public distribution networks. □

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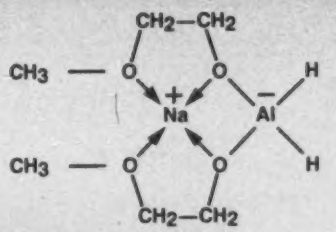

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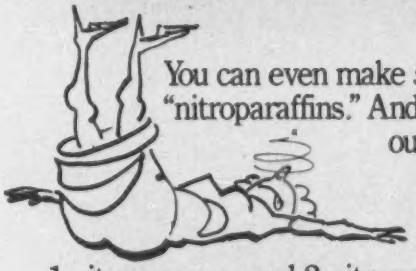

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Facts & Figures

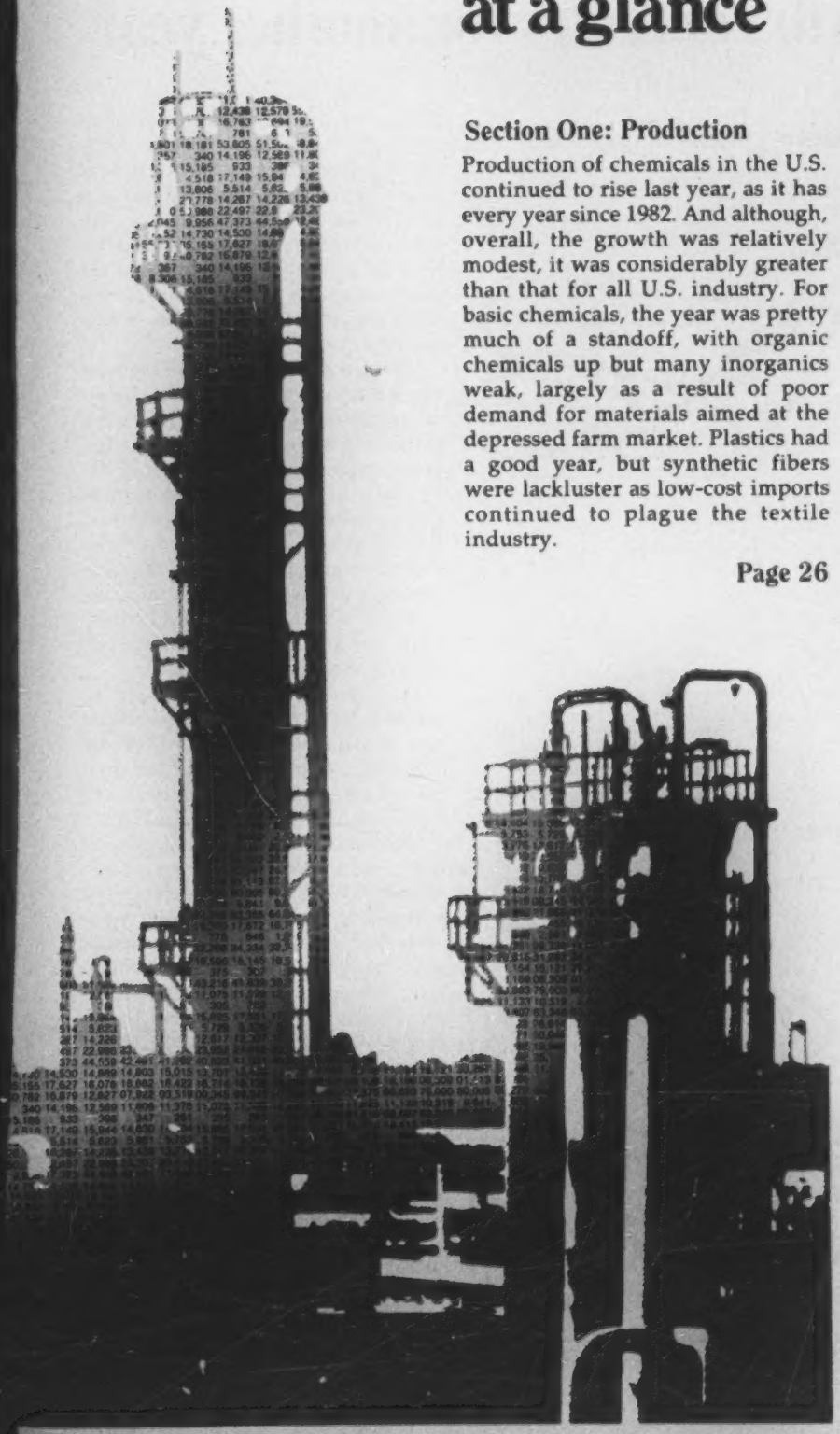
for the chemical industry

Much like the year before, 1986 was a period of steady but rather weak growth for the U.S. chemical industry. Output was up 5%, but that overall figure masks a mixture of favorable growth for such products as organic chemicals and plastics with more disappointing results for synthetic fibers and, especially, agricultural chemicals.

Where last year did differ markedly from 1985 is on the bottom line of chemical companies' profit-and-loss statements. The drastic cost-cutting measures of the past few years, which had impinged especially heavily on 1985's financial record, paid off handsomely in higher earnings and sturdier balance sheets for many companies in 1986.

These developments are depicted statistically in the data published on the following pages of C&EN's annual Facts & Figures issue. They detail the recent performance of the chemical industry in the U.S. and, to a lesser degree, in several major chemical-producing countries abroad. These data have been collected from a wide variety of sources, including government agencies, trade associations, and international organizations, as well as from the companies themselves that make up the chemical industry. C&EN itself has, in many instances, used the basic statistics to develop analytical measures and comparisons that add broader perspective to the industry's recent record.

at a glance



Section One: Production

Production of chemicals in the U.S. continued to rise last year, as it has every year since 1982. And although, overall, the growth was relatively modest, it was considerably greater than that for all U.S. industry. For basic chemicals, the year was pretty much of a standoff, with organic chemicals up but many inorganics weak, largely as a result of poor demand for materials aimed at the depressed farm market. Plastics had a good year, but synthetic fibers were lackluster as low-cost imports continued to plague the textile industry.

Page 26

Section Two: Finance

Although sales were only slightly higher than the year before, chemical companies' streamlining efforts of the past two or three years finally bore fruit, as profits for many firms rebounded strongly in 1986. The industry remains very cost conscious, nonetheless; capital spending, for example, continues to be held in rein, and R&D budgets, although still expanding, are not doing so at so fast a rate as previously.

Page 35

Section Three: Employment

The number of workers employed by chemical companies has been on a downtrend since the end of 1984 that has carried it to the lowest level in more than a decade. But with output a bit higher, a smaller work force means that productivity in the industry has been improving and unit labor costs are lower.

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Section Four: Foreign Trade

Thanks largely to the weakness of the U.S. dollar, the U.S. trade surplus in chemicals expanded a bit last year following five years of steady decline. Total world trade in chemicals was higher last year, too, though not nearly so much as the dollar figures might suggest.

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Section Five: Foreign Chemical Industries

Although growth in output of many major chemicals faltered in 1986, profitability generally was higher among the major producers both in West Europe and Canada. In Japan, however, not only did production of most large-volume chemicals slump but earnings of the largest chemical companies also were well below those of the year before.

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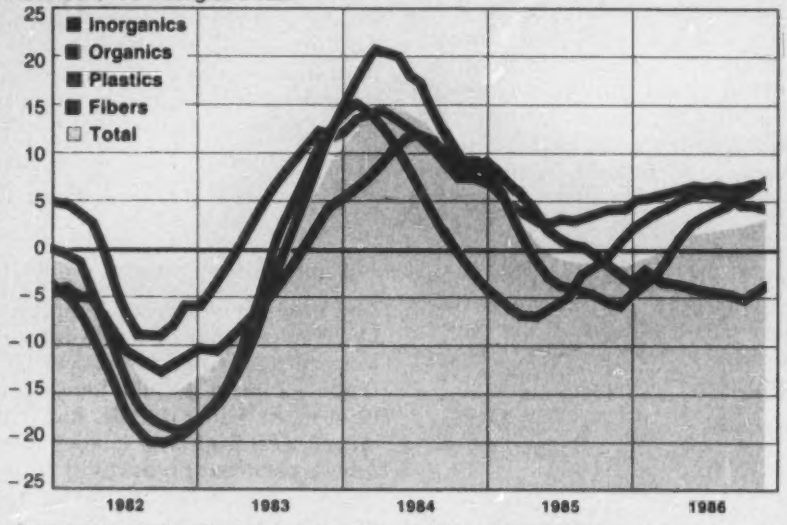
1 Production by the U.S. Chemical Industry

Moderate growth continues for another year

Chemical growth rates held relatively stable during 1986

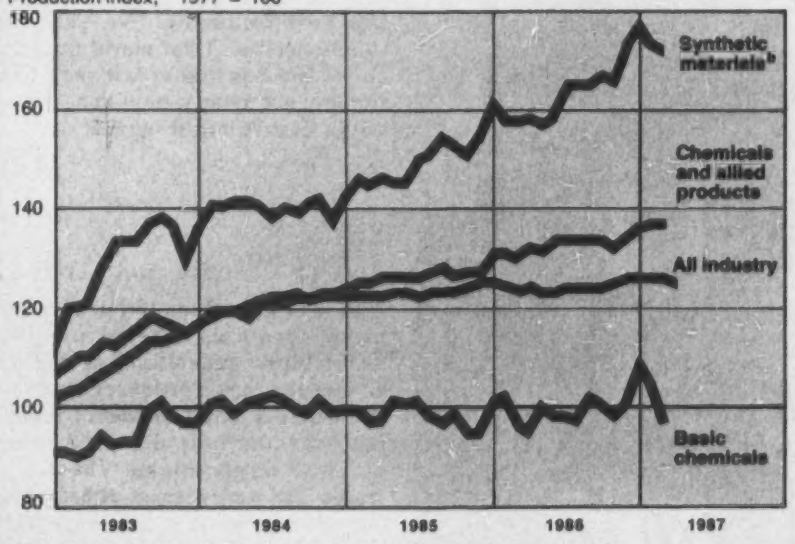
Production, % annual growth rate[a]



a Average running annual growth rates in production of major plastics, inorganic and organic chemicals, and all chemicals, and in shipments of man-made fibers. **Sources:** International Trade Commission, Bureau of the Census, Society of the Plastics Industry, Textile Economics Bureau

Chemical output has edged higher in the past year

Production index,[a] 1977 = 100



a Seasonally adjusted. b Includes plastics, synthetic rubber, and man-made fibers.
Source: Federal Reserve Board

Output of U.S. chemical plants was 5% higher last year than in 1985. That performance for chemicals was much better than industry did as a whole, however; total industrial production was up only 1%. And in the first half of 1987, the chemical industry appears to be maintaining the slow but steady growth it sustained throughout 1986.

Plastic materials again were among the strongest sectors of the chemical industry, with output rising for the fourth straight year. Production of thermoplastic resins increased 7%, led by a 22% increase in output of thermoplastic polyester. Nylon, polypropylene, and polystyrene also posted large gains. Among thermosets, output of epoxy, polyester, urea, and phenolic resins grew a little in 1986, but melamine output dropped off for the second straight year.

Man-made fibers production increased sluggishly in 1986. Nylon and olefin fibers outperformed the other noncellulosics, while production of acetate and rayon rebounded 11% after having slumped in 1985.

Output of basic chemicals was up only 1% in 1986 from a year earlier. Organic chemicals, industrial gases, and inorganic pigments grew moderately, but the sector as a whole was dragged down by steep drops in production of fertilizer materials. Production of fertilizers themselves was off close to 20%, compared with 1985. Financial problems on U.S. farms have caused a sharp drop in demand for agricultural chemicals of all types, and export markets also have been weak despite the decline in the value of the U.S. dollar.

The chemically related products sector raised output 6% in 1986, about the same as for the chemical industry as a whole. Production of soap and toiletries was up 11%, that of drugs up 5%, and paint production increased only 1% over the previous year.

TOP 50 CHEMICALS: Rebound in organic chemical output balances slump for inorganics

Rank			Billions of lb		Common units[b]		Average annual growth			
1988	1985[a]		1986	1985	1986	1985	1985–86	1984–85	1981–85	1976–86
1	1	Sulfuric acid	73.64	79.30	36,822 tt	39,651 tt	−7.1%	−5.1%	−2.0%	0.5%
2	2	Nitrogen	48.62	47.46	671 bcf	655 bcf	2.4	−0.9	6.5	8.8
3	4	Oxygen	33.03	32.53	399 bcf	393 bcf	1.5	2.1	−1.5	0.4
4	6	Ethylene	32.81	29.85	32,811 mp	29,847 mp	9.9	−4.9	2.2	3.9
5	5	Lime[c]	30.34	31.60	15,172 tt	15,800 tt	−4.0	−1.2	−4.3	−2.3
6	3	Ammonia	28.01	34.64	14,005 tt	17,319 tt	−19.1	3.8	−6.0	−1.8
7	7	Sodium hydroxide	22.01	21.79	11,007 tt	10,893 tt	1.0	−0.2	1.1	0.5
8	9	Chlorine	20.98	20.79	10,489 tt	10,395 tt	0.9	−2.8	−0.5	0.1
9	8	Phosphoric acid	18.41	21.04	9,206 tt	10,518 tt	−12.5	−7.5	−1.6	1.5
10	11	Propylene	17.34	14.89	17,343 mp	14,887 mp	16.5	−4.3	5.2	5.6
11	10	Sodium carbonate[d]	17.20	17.19	8,600 tt	8,597 tt	0.0	1.0	0.8	5.1
12	15	Ethylene dichloride	14.53	12.10	14,529 mp	12,101 mp	20.1	13.0	7.8	6.1
13	12	Nitric acid	13.12	14.73	6,562 tt	7,364 tt	−10.9	−4.7	−6.3	−1.7
14	14	Urea[e]	12.06	13.36	6,029 tt	6,678 tt	−9.7	−10.2	−5.6	4.4
15	13	Ammonium nitrate[f]	11.11	13.55	5,556 tt	6,776 tt	−18.0	−5.2	−8.9	−2.5
16	17	Benzene	10.23	9.39	1,389 mg	1,275 mg	8.9	−3.3	1.2	−0.3
17	20	Ethylbenzene	8.92	7.39	8,915 mp	7,386 mp	20.7	−2.3	2.7	4.4
18	18	Carbon dioxide[g]	8.50	9.25	4,252 tt	4,623 tt	−8.0	1.3	2.3	8.0
19	16	Vinyl chloride	8.42	9.46	8,415 mp	9,463 mp	−11.1	55.5	4.1	4.0
20	19	Styrene	7.84	7.82	7,838 mp	7,622 mp	2.8	−1.1	3.3	2.2
21	21	Terephthalic acid[h]	7.68	6.49	7,684 mp	6,490 mp	18.4	9.8	4.3	0.6
22	27	Methanol	7.33	5.00	7,327 mp	5,003 mp	46.5	−38.9	−3.1	1.6
23	22	Hydrochloric acid	5.97	5.61	2,983 tt	2,807 tt	6.3	2.7	3.0	1.6
24	24	Ethylene oxide	5.94	5.43	5,943 mp	5,430 mp	9.4	−4.7	2.9	3.6
25	22	Formaldehyde[i]	5.89	5.61	5,885 mp	5,606 mp	5.0	−3.6	0.6	0.8
26	26	Toluene[j]	5.82	5.07	802 mg	699 mg	14.7	−4.0	−1.2	−2.2
27	25	Xylene	5.55	5.31	771 mg	738 mg	4.5	−13.6	−2.6	0.7
28	30	Ethylene glycol	4.76	4.18	4,759 mp	4,178 mp	13.9	−13.4	2.8	3.6
29	28	*p*-Xylene	4.67	4.78	4,669 mp	4,779 mp	−2.3	12.1	0.6	4.8
30	29	Ammonium sulfate	4.17	4.19	2,086 tt	2,093 tt	−0.3	1.3	−0.9	0.4
31	31	Cumene	3.70	3.35	3,695 mp	3,345 mp	10.5	−10.9	2.2	3.1
32	32	Acetic acid	2.93	2.90	2,931 mp	2,897 mp	1.2	10.6	−0.9	1.8
33	34	Phenol[k]	2.92	2.78	2,921 mp	2,777 mp	5.2	−3.9	2.5	3.3
34	39	Butadiene[l]	2.59	2.34	2,593 mp	2,340 mp	10.8	−4.6	−2.8	−3.0
34	35	Carbon black	2.59	2.57	2,585 mp	2,571 mp	0.5	−11.1	−1.1	−1.6
36	33	Potash[m]	2.58	2.84	1,169 tmt	1,288 tmt	−9.2	−17.6	−11.5	−6.0
37	36	Aluminum sulfate	2.52	2.54	1,258 tt	1,268 tt	−0.8	12.3	−0.6	0.5
38	37	Propylene oxide	2.48	2.40	2,480 mp	2,400 mp	3.3	34.9	6.1	3.1
39	38	Acrylonitrile	2.31	2.35	2,314 mp	2,346 mp	−1.4	5.7	3.0	4.3
40	40	Vinyl acetate	2.25	2.11	2,249 mp	2,112 mp	6.5	4.3	3.0	4.3
41	41	Methyl *tert*-butyl ether[n]	2.24	1.89	2,237 mp	1,891 mp	18.3	37.4	24.1	nm
42	44	Cyclohexane	2.07	1.66	2,071 mp	1,657 mp	25.0	−16.9	2.6	−0.5
43	42	Acetone	1.94	1.79	1,936 mp	1,788 mp	8.3	−4.0	−2.0	0.4
44	43	Titanium dioxide	1.83	1.72	917 tt	860 tt	6.6	3.0	3.8	2.5
45	48	Sodium silicate	1.57	1.44	786 tt	721 tt	9.0	−3.9	0.4	0.5
46	46	Calcium chloride[o]	1.56	1.88	780 tt	940 tt	−17.0	−10.4	−3.2	−4.2
47	45	Sodium sulfate[p]	1.55	1.65	775 tt	827 tt	−6.3	−5.2	−6.9	−4.5
48	47	Adipic acid	1.52	1.45	1,522 mp	1,453 mp	4.7	4.5	2.0	0.0
49	50	Isopropyl alcohol	1.28	1.24	1,275 mp	1,235 mp	3.2	−11.4	−5.2	−4.1
50	49	Sodium tripolyphosphate	1.27	1.25	634 tt	625 tt	1.4	−7.4	−1.8	−1.3
TOTAL ORGANICS			188.00	172.16			9.2%	−1.9%	1.8%	2.9%
TOTAL INORGANICS			350.60	369.56			−5.1%	−2.0%	−1.5%	0.8%
GRAND TOTAL			538.60	541.72			−0.6%	−2.0%	−0.5%	1.5%

a Revised. b tt = thousands of tons, bcf = billions of cubic feet, mp = millions of pounds, mg = millions of gallons, tmt = thousands of metric tons. c Except refractory dolomite. d Natural and synthetic. e 100% basis. f Original solution. g Liquid and solid only. h Includes both acid and ester without double counting. i 37% by weight. j All grades. k Synthetic only. l Rubber grade. m K_2O basis. n Production data for earlier years unavailable. o Solid and liquid. p High and low purity. nm = not meaningful.

1 Production by the U.S. Chemical Industry

PRODUCTION: Chemical industry as a whole shows modest growth

Industrial production indexes, 1977 = 100	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual change 1985–86	Annual change 1976–86
Total index	125.1	123.8	121.4	109.2	103.1	111.0	108.6	110.7	106.5	100.0	92.6	1%	3%
Manufacturing, total	129.1	126.4	123.4	110.2	102.2	110.5	108.2	111.5	107.1	100.0	91.9	2	3
Nondurable manufacturing	130.9	125.1	122.3	113.7	105.5	109.7	107.0	108.2	105.5	100.0	93.1	5	3
Chemicals and products	133.0	127.1	121.6	114.0	103.8	112.6	108.4	111.4	106.8	100.0	92.8	5	4
Chemicals and synthetic materials	123.3	117.7	114.7	109.1	95.4	109.4	99.4	113.7	108.2	100.0	90.0	5	3
Basic chemicals	99.5	98.8	100.6	95.0	90.6	104.3	107.2	110.1	110.7	100.0	94.8	1	0
Alkalies and chlorine	97.5	97.2	97.8	91.5	83.3	96.1	104.1	113.6	101.7	100.0	109.9	0	−1
Industrial gases	131.8	120.3	123.6	114.0	103.9	115.4	105.0	107.2	98.7	100.0	84.3	10	5
Inorganic pigments	100.6	91.8	95.4	91.5	81.7	99.0	97.6	100.8	103.5	100.0	109.2	10	−1
Inorganic chemicals, nec	94.3	96.4	97.9	92.9	90.9	104.6	109.4	111.1	115.3	100.0	92.4	−2	0
Industrial organic chemicals	111.2	107.9	106.2	104.0	90.3	105.5	89.1	108.1	104.5	100.0	88.5	3	2
Synthetic materials	163.1	149.4	140.3	129.0	108.0	120.2	110.1	125.8	112.2	100.0	89.2	9	6
Plastics materials	220.9	197.4	179.8	158.7	129.9	136.1	122.1	132.6	115.6	100.0	86.7	12	10
Synthetic rubber	96.5	96.8	107.6	98.3	86.8	91.2	93.0	112.1	99.0	100.0	98.9	0	0
Man-made fibers	98.5	95.3	94.1	95.4	82.9	104.6	97.3	119.4	110.2	100.0	89.8	3	1
Chemical products	150.1	141.7	132.4	123.2	114.7	116.5	113.7	110.1	106.7	100.0	95.4	6	5
Drugs and medicines	135.3	129.0	121.7	118.8	114.2	112.0	112.9	107.5	105.1	100.0	95.9	5	4
Soap and toiletries	188.7	170.4	155.9	139.9	125.4	129.6	121.5	115.0	106.6	100.0	96.3	11	7
Paints	100.3	99.5	92.9	90.1	83.5	86.7	89.7	95.0	104.7	100.0	94.8	1	1
Agricultural chemicals	85.6	96.1	98.2	86.9	90.2	109.2	107.3	103.9	97.5	100.0	92.5	−11	−1
Petroleum products	92.1	86.8	87.4	84.0	84.2	89.4	94.0	101.7	102.5	100.0	92.8	6	0
Rubber and plastics products	153.4	146.9	143.5	124.3	110.2	116.4	107.8	114.9	107.5	100.0	84.9	4	6

nec = not elsewhere classified. Source: Federal Reserve Board

MINERALS: Operations were down again in 1986, continuing a long-term trend

Thousands of tons	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual change 1985–86	Annual change 1976–86
Bromine, sold or used[a]	163[b]	160	193	185	200	189	189	249	223	217	230	2%	−3%
Calcium chloride, production[c,d]	780[b]	940	1,036	912	853	917	811	981	1,031	968	897	−17	−1
Iodine, consumption[e,f]	na	na	3.8[b]	4.1	3.4	4.4	4.4	4.4	4.0	4.3	3.6	na	na
Imports[f]	1.5[b]	2.7	2.6	3.1	2.3	3.0	3.1	3.1	3.4	3.5	3.2	−44	−7
Lime, sold or used[g]	14,000[b]	15,713	15,922	14,867	14,075	18,890	19,037	20,983	20,484	19,987	20,257	−11	−4
Lithium, consumption[e,h]	2.4[b]	2.5	3.2	2.2	2.0	3.2	3.0	3.2	3.4	4.1	2.8	−4	−2
Phosphate rock													
Marketable production	41,744	56,035	54,230	46,928	41,241	59,110	59,982	56,891	55,156	52,091	49,231	−26	−2
Exports	9,945	11,336	12,707	13,239	10,849	11,458	15,737	15,827	14,187	14,584	10,398	−12	0
Potash (K_2O equivalent)[i]													
Production	1,213[b]	1,429	1,724	1,575	1,967	2,377	2,468	2,453	2,484	2,457	2,400	−15	−7
Imports[j]	4,850[b]	5,063	5,323	4,894	4,253	5,287	5,481	5,693	5,189	5,076	4,954	−4	0
Apparent consumption	5,527[b]	5,893	6,638	6,231	5,647	6,849	6,999	7,626	6,840	6,605	6,149	−6	−1
Salt, total sold or used[k]	36,800[b]	39,464	39,225	34,573	37,894	38,915	40,396	45,820	42,896	43,439	44,218	−7	−2
Evaporated[l]	6,256[b]	5,923	5,492	5,532	5,305	6,209	6,358	6,248	5,872	5,704	5,634	6	1
Rock[l]	13,616[b]	13,819	13,337	12,446	12,884	11,871	11,806	14,891	14,688	14,958	15,668	−1	−1
Salt in brine[l]	16,928[b]	19,742	20,397	16,595	19,705	20,835	22,231	24,681	22,336	22,777	22,917	−14	−3
Sodium carbonate, production[d]	8,600[b]	8,597	8,511	8,467	7,619	8,281	8,275	8,253	8,290	8,040	7,560	0	1
Sulfur, production[m]	12,221	12,797	11,742	10,240	10,788	13,388	13,080	13,339	12,318	11,824	11,992	−4	0
Apparent consumption[n]	11,669	13,192	13,976	12,112	11,088	14,093	15,056	15,145	13,889	12,850	12,060	−12	0
Frasch, production	4,457	5,524	4,622	3,530	4,641	6,997	7,044	7,007	6,226	6,520	7,016	−19	−4
Recovered elemental, production	6,411	5,857	5,747	5,462	4,855	4,695	4,490	4,486	4,478	3,995	3,514	9	6
Other, production	1,354	1,416	1,372	1,249	1,293	1,695	1,547	1,845	1,615	1,310	1,462	−4	−1

a Elemental bromine sold as such or used in preparation of bromine compounds by primary producers. b Preliminary figure. c 75% $CaCl_2$ equivalent. d Natural and synthetic. e Estimated apparent consumption. f Crude elemental iodine. g Includes Puerto Rican production. h Lithium content basis. i Includes muriate and sulfate of potash, potassium magnesium sulfate, and peruvian salts; excludes other chemical compounds containing potassium. j Includes nitrate of potash. k Total obtained by all recovery methods that was sold or used by domestic producers (figures differ slightly from U.S. production figures); figures for 1973–81 include Puerto Rican production. l Sold or used as such. m Sulfur content basis. n Calculated from shipments plus imports minus exports (sulfur content basis). na = not available. Source: Bureau of Mines

1 Production by the U.S. Chemical Industry

ORGANIC CHEMICALS: Output last year generally increased—for some products sharply

Millions of lb unless otherwise noted	Production											Annual change	
	1986[a]	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
Acetic acid, synthetic	2,931	2,897	2,619	2,807	2,748	2,705	2,977	3,265	2,776	2,570	2,463	1%	2%
Acetone	1,936	1,788	1,862	1,859	1,694	2,144	2,076	2,653	2,519	2,219	1,869	8	0
Acrylonitrile	2,314	2,349	2,219	2,146	2,035	1,997	1,830	2,018	1,752	1,646	1,518	−1	4
Aniline	823	716	786	663	557	634	659	690	606	584	544	15	4
Benzene, mg[b,c]	1,395	1,283	1,318	1,232	1,052	1,308	1,534	1,612	1,435	1,371	1,365	9	0
Bisphenol A	823	949	762	643	480	555	530	576	471	455	449	−13	6
1,3-Butadiene[d]	2,646	2,340	2,452	2,353	1,915	2,986	2,799	3,583	3,515	3,259	3,507	13	−3
1-Butanol	868	716	908	833	730	809	790	766	756	660	625	21	3
Caprolactam	1,104	1,089	1,027	977	793	928	905[e]	945	919	867	780	1	4
Carbon tetrachloride	625	646	713	573	587	726	710	714	737	809	857	−3	−3
Chloroform	422	275	405	362	299	405	273	356	349	302	292	53	4
Cumene	3,695	2,627	3,754	3,345	2,743	3,309	3,459	3,917	3,380	2,644	2,716	41	3
Cyclohexane	2,071	1,657	1,994	1,656	1,275	1,820	1,964	2,425	2,332	2,265	2,187	25	−1
Dioctyl phthalate	290	275	301	300	266	304	353	336	409	400	413	5	−3
Dodecylbenzene[e]	na	547	561	545	509	535	563[f]	627	526	526	529	na	na
Ethanol, synthetic	513	649	1,060	1,077	1,023	1,317	1,451	1,408	1,267	1,339	1,496	−21	−10
Ethanolamines[g]	549	537	504	468	416	429	376	420	362	308	286	2	7
Ethylbenzene	8,938	7,386	7,562	7,876	6,656	7,813	7,642	8,448	8,385	8,312	5,770	21	4
Ethyl chloride	160	171	290	282	339	324	396	582	540	612	669	−6	−13
Ethylene	32,811	29,847	31,383	28,680	24,501	29,418	28,667	29,904	25,955	25,172	22,475	10	4
Ethylene dichloride	14,597	12,101	10,710	11,506	7,619	9,974	11,108	11,794	11,001	10,997	8,342	21	6
Ethylene glycol	4,737	4,178	4,823	4,425	4,309	4,143	4,386	4,729	3,904	3,675	3,335	13	4
Ethylene oxide	5,935	5,430	5,699	5,534	4,987	4,937	5,220	5,665	5,012	4,364	4,184	9	4
2-Ethylhexanol	570	536	541	387	325	389	367	318	420	493	450	6	2
Formaldehyde, 37%[h]	5,861	5,606	5,815	5,465	4,817	5,721	5,555	5,971	6,381	6,046	5,449	5	1
Isopropyl alcohol	1,273	1,235	1,394	1,209	1,380	1,669	1,836	1,900	1,730	1,888	1,936	3	−4
Maleic anhydride	350	394	359	299	260	293	304	323	341	294	264	−11	3
Methanol, synthetic	7,323	5,003	8,186	7,982	7,555	8,577	7,153	7,367	6,443	6,453	6,242	46	2
Methyl chloride	412	410[a]	482	409	366	405	362	463	454	476	378	0	1
Methyl ethyl ketone	582	537	543	531	468	614	692	716	644	635	631	8	−1
Methyl methacrylate	941	858	917	844	721	592	564	633	570	478	538	10	6
Methylchloroform	648	869	675	586	595	611	587	656	661	512	428	−25	4
Methylene chloride	559	467	607	584	532	891	780	931	na	745	na	20	na
Perchloroethylene	414	678	573	547	585	691	765	773	725	614	669	−39	−5
Phenol, synthetic[i]	2,921	2,841	2,889	2,638	2,023	2,578	2,568	2,981	2,682	2,338	2,121	3	3
Phthalic anhydride	864	820	870	838	684	870	818	1,013	978	926	902	5	0
Propylene[j]	17,343	14,887	15,559	13,959	12,535	13,482	13,676	14,198	13,014	13,328	10,030	16	6
Propylene glycol	606	500	462	484	400	473	488	610	547	489	517	22	2
Styrene	7,853	7,622	7,709	6,802	5,942	6,679	6,856	7,484	7,186	6,867	6,301	3	2
Terephthalic acid, dimethyl ester[k]	7,684	6,490	5,912	5,626	4,843	6,235	6,054	6,159	5,954	5,410	5,051	18	4
Toluene, mg[b,l]	804	698	728	780	714	852	1,010	1,001	1,046	1,008	990	15	−2
Vinyl acetate	2,205	2,112	2,024	1,963	1,876	1,936	1,922	1,982	1,692	1,586	1,481	4	4
Vinyl chloride	8,415	9,463	6,084	6,875	4,902	6,874	6,466	6,389	6,941	5,986	5,677	−11	4
***o*-Xylene**	789	675	688	781	802	918	995	1,082	1,013	985	854	17	−1
***p*-Xylene**	4,995	4,779	4,264	4,114	3,391	4,532	4,238	4,650	3,516	3,172	2,911	5	6

a Preliminary. b Tar distillers and coke-oven operators not included. c Specification grades. d Rubber grade. e Includes straight-chain dodecylbenzene, tridecylbenzene, and other straight-chain alkylbenzenes. f Preliminary figure, final figure not available. g Mono-, di-, and triethanolamines. h By weight. i Does not include data for coke ovens and gas-retort ovens. j All grades. k Includes both acid and dimethyl ester (DMT), without double counting. l High-purity toluene, includes material used in blending motor fuel. mg = millions of gallons. na = not available.
Source: International Trade Commission

INORGANICS: Production growth weak at best, with sharp declines for farm-related chemicals

Thousands of tons unless otherwise noted	Production											Annual change	
	1986[a]	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
Aluminum sulfate[b]	1,258	1,268	1,129	1,119	1,154	1,294	1,286	1,315	1,309	1,255	1,202	−1%	0%
Ammonia,[c,d] 100%	14,005	17,319	16,692	14,072	15,801	19,044	19,653	18,634	17,119	17,765	16,716	−19	−2
Ammonium nitrate,[e] 100%	5,556	6,776	7,146	6,240	7,091	8,861	9,128	8,293	7,210	7,177	7,186	−18	−3
Ammonium sulfate,[d,f] 100%	2,085	2,093	2,067	1,956	1,768	2,185	2,136	2,363	2,449	2,264	2,010	0	0
Chlorine gas[g]	10,426	10,402	10,700	9,960	9,176	10,763	11,421	12,291	11,052	10,573	10,378	0	0
Hydrochloric acid,[h] 100%	2,929	2,807	2,732	2,468	2,450	2,574	2,888	3,090	2,793	2,668	2,542	4	1
Hydrogen,[i,j] bcf, 100%	123	121	109	103	88	105	107	106	90	85	82	2	4
Nitric acid,[k] 100%	6,562	7,631	7,726	6,768	7,390	9,093	9,231	8,916	7,934	7,987	7,791	−14	−2
Nitrogen gas,[i,l] bcf, 100%	671	665	661	560	483	490	479	427	379	328	289	1	9
Oxygen, bcf,[i,l] 100%	399	393	375	346	349	431	431	456	430	392	388	2	0
Phosphoric acid, 100% P_2O_5	9,206	10,518	11,370	9,767	8,253	9,958	10,848	10,318	9,637	8,745	7,949	−12	1
Phosphorus[m]	362	359	386	366	361	426	432	460	441	430	437	1	−2
Sodium chlorate, 100%	273	259	295	323	291	297	312	269	265	251	199	5	3
Sodium hydroxide, 100%	11,055	10,811	10,914	10,039	9,385	10,621	11,625	12,759	11,309	11,000	10,516	2	1
Sodium phosphate[n]	633	625	675	669	651	696	727	757	739	717	724	1	−1
Sodium silicate[o]	787	737	685	710	664	771	805	813	829	760	747	7	1
Sodium sulfate,[p] 100%	800	1,203	901	914	864	1,111	1,140	1,121	1,174	1,199	1,232	−33	−4
Sulfuric acid,[q] 100%	36,822	39,651	41,802	36,583	33,233	40,742	44,158	43,204	41,314	38,337	34,878	−7	1
Titanium dioxide,[r] 100%	917	860	835	760	660	761	727	742	701	687	713	7	3
Urea	6,029	6,678	7,433	6,137	6,470	8,062	7,830	7,000	6,273	5,072	4,498	−10	3

a Preliminary. b Commercial, 17% Al_2O_3; includes municipalities. c Synthetic anhydrous. d Excludes by-product ammonia liquor and ammonium sulfate. e Original solution. f Synthetic and noncoke by-product. g Includes quantities liquefied for use, storage, or shipment. h Includes anhydrous hydrochloric acid production. i High- and low-purity gas. j Liquid and gas; excludes amounts vented and used as fuel, and amounts produced in petroleum refineries for captive use. k Includes unspecified amounts of nitric acid produced but not withdrawn from the system. l Excludes amounts produced and consumed in making synthetic ammonia or ammonia derivatives. m Elemental, white (yellow), and red. n Tripolyphosphate (100% $Na_5P_3O_{10}$). o Soluble silicate glass (water glass), solid and liquid (anhydrous); excludes amounts produced and consumed in making meta-, ortho-, and sesquisilicates. p Anhydrous, high and low purity, and Glauber's salt. q Gross (new and fortified). r Composite and pure. **Note:** bcf = billions of cubic feet. **Sources:** Department of Commerce, International Trade Commission

Man-made noncellulosic fibers output

Billions of lb

MAN-MADE FIBERS: Nylon, olefins production up in 1986

Millions of lb	Production											Annual change	
	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
NONCELLULOSIC FIBERS													
Acrylic[a]	616	631	671	671	624	691	779	761	726	709	621	−2%	0%
Nylon	2514[b]	2343[b]	2412[b]	2419[b]	1927	2332	2358	2720	2550	2326	2075	7	2
Olefins[c]	1393	1249	997	906	723	785	748	759	692	635	577	12	9
Polyester	3305	3341	3392	3544	3169	4176	3989	4178	3800	3642	3340	−1	0
CELLULOSIC FIBERS													
Acetate[d]	619	558	199	229	196	261	316	324	308	290	298	11	−3
Rayon			421	401	388	509	490	606	597	598	543		
GLASS FIBER	na	na	1394	1168	899	1041	867	1014	923	787	676	na	na
TOTAL[e]	8447	8122	9486	9336	7928	9795	9547	10362	9596	8987	8130	4%	nc

Note: Totals may not add because of rounding. a Includes modacrylic. b Excludes aramid in 1983–86. c Includes olefin yarn and monofilaments and olefin and vinyon staple, tow, and fiberfill. d Includes diacetate and triacetate; excludes production for cigarette filters. e Totals for 1985 and 1986 exclude glass fiber. na = not available. nc = not comparable. **Source:** Textile Economics Bureau

1 Production by the U.S. Chemical Industry

SYNTHETIC RUBBER: Total production recovered a bit in 1986

Thousands of metric tons	Production											Annual change	
	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
Styrene-butadiene rubber[a]	792	735	958	904	876	1032	1074	1378	1395	1395	1333	8%	−5%
Polybutadiene	325	330	359	333	288	342	311	397	378	361	352	−2	−1
Nitrile	58	53	67	55	45	66	63	75	73	70	73	9	−2
Ethylene-propylene	230	215	215	175	123	178	144	175	174	158	130	7	6
Other[b]	582	505	556	468	498	404	423	509	453	432	415	15	3
TOTAL	**1987**	**1838**	**2155**	**1935**	**1830**	**2022**	**2015**	**2534**	**2473**	**2416**	**2303**	**8%**	**−1%**

a Excludes high-styrene latex. b Includes butyl, polychloroprene, polyisoprene, silicone, and other synthetic elastomers. Some values are estimated. **Source:** Rubber Manufacturers Association

Plastics production

Billions of lb

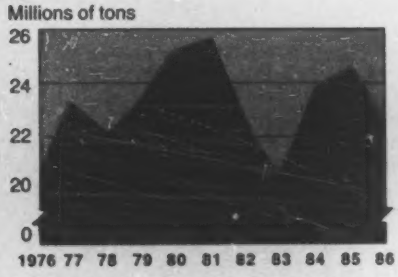
PLASTICS: Output rises again for fourth straight year

Millions of lb[a]	Production											Annual change	
	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
THERMOSETTING RESINS													
Epoxy[b]	398	385	406	334	286	336	315	361	299	261	244	3%	5%
Polyester[c]	1,271	1,223	1,232	1,084	865	997	947	1,147	1,209	1,061	1,042	4	2
Urea	1,271	1,210	1,199	1,172	998	1,165	1,165	1,367	1,122	963	821	5	4
Melamine	173	192	210	180	158	179	167	200	202	200	186	−10	−1
Phenolic[d]	2,735[e]	2,621[e]	2,502[e]	2,477[e]	2,006[e]	2,333[e]	1,499	1,781	1,617	1,458	1,340	4	nc
TOTAL	**5,846**	**5,631**	**5,549**	**5,247**	**4,313**	**5,010**	**4,093**	**4,856**	**4,449**	**3,943**	**3,633**	**4%**	**nc**
THERMOPLASTIC RESINS													
Polyethylene													
Low density[f]	8,903	8,889	8,413	8,041	7,503	7,693	7,291	7,793	7,111	6,471	5,813	0	4
High density[g]	7,182	6,671	6,085	5,689	4,928	4,695	4,405	5,010	4,201	3,652	3,125	8	9
Polypropylene	5,812	5,139	4,940	4,433	3,477	3,955	3,648	3,841	3,074	2,747	2,632	13	8
Styrene-acrylonitrile	92	87	99	93	91	107	111	124	120	115	113	6	−2
Polystyrene	4,470	4,054	3,838	3,570	3,191	3,621	3,521	4,005	3,823	3,446	3,195	10	3
Acrylonitrile-butadiene-styrene and other styrene polymers[h]	2,195	2,036	2,127	1,889	1,380	1,745	1,705	2,107	2,012	1,882	1,744	8	2
Polyamide, nylon type	465	399	396	321	228	312	274	327	275	254	247	17	7
Polyvinyl chloride and copolymers	7,256	6,772	6,760	6,067	5,326	5,707	5,470	6,119	5,723	5,253	4,716	7	4
Thermoplastic polyester	1,175	965	899	778	648	609	na	na	na	na	na	22	na
Other vinyl resins[i]	195	190	187	186	177	208	196	220	197	197	225	3	−1
TOTAL	**37,745**	**35,202**	**33,744**	**31,067**	**26,949**	**28,652**	**26,621**	**29,546**	**26,536**	**24,017**	**21,810**	**7%**	**6%**

Note: Totals are for those products listed and exclude some small-volume plastics. a Dry-weight basis unless otherwise specified. b Unmodified. c Unsaturated. d Includes other tar acid resins. e Gross-weight basis. f Density 0.940 and below. g Density above 0.940. h Includes styrene-butadiene copolymers and other styrene-based polymers. i Includes polyvinyl butyral, polyvinyl formal, and polyvinylidene chloride. na = not available. nc = not comparable. **Source:** Society of the Plastics Industry

Fertilizer production

Millions of tons



Note: Total U.S. production of nitrogen, phosphate, and potash fertilizer. Years ending June 30.
Source: Department of Agriculture

FERTILIZERS: Production, supply down in all categories

Thousands of tons	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual change 1985–86	Annual change 1976–86
NITROGEN (N)													
Domestic production	10,425	12,532	10,364	9,855	11,598	13,036	12,323	11,106	10,466	10,789	10,572	−17%	0%
Imports	3,979	3,598	3,940	2,654	2,531	2,455	2,566	2,165	1,866	1,842	1,218	11	13
Exports	2,068	3,227	2,080	2,074	2,499	3,088	2,641	2,468	1,778	1,251	1,239	−36	5
Domestic supply	12,336	12,903	12,224	10,435	11,630	12,403	12,248	10,803	10,554	11,380	10,551	−4	2
PHOSPHATE (P_2O_5)													
Domestic production	8,581	10,666	9,611	8,043	7,818	10,471	10,012	9,432	8,245	7,793	7,199	−20	2
Imports	111	141	121	133	193	250	239	236	229	245	221	−21	−7
Exports	3,768	5,547	4,352	3,916	3,751	4,381	3,925	3,848	3,290	2,501	2,175	−32	6
Domestic supply	4,924	5,260	5,380	4,260	4,260	6,340	6,326	5,820	5,184	5,537	5,245	−6	−1
POTASH (K_2O)													
Domestic production	1,052	1,413	1,653	1,859	1,831	2,262	2,474	2,519	2,176	2,584	2,313	−26	−8
Imports	4,759	5,355	5,164	4,402	4,797	5,487	5,403	5,085	4,948	4,955	3,910	−11	2
Exports	494	588	528	624	641	876	1,048	999	1,003	994	911	−16	−6
Domestic supply	5,317	6,180	6,289	5,637	5,987	6,873	6,829	6,605	6,121	6,545	5,312	−14	0

Note: Years ending June 30. **Source:** Department of Agriculture

NITROGEN: Output drops steeply in 1986

Thousands of tons (N)	Production 1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual change 1985–86	Annual change 1976–86
Ammonia[a]	4,610	5,255	4,179	3587	5,032	5,348	5,270	4,603	4,063	4,307	4,594	−12%	0%
Ammonium nitrate[b,c]	704	836	913	943	1,105	1,157	1,096	1,137	1,044	1,169	1,265	−16	−6
Ammonium sulfate[c]	482	484	517	395	432	502	521	509	497	547	562	0	−2
Urea	1,624	1,999	1,786	1692	1,684	1,383	1,572	1,201	1,001	937	941	−19	6
All other	3,005	3,958	2,969	3238	3,345	3,964	3,864	3,656	3,871	3,829	3,210	−24	−1
TOTAL	10,425	12,532	10,364	9855	11,598	12,354	12,323	11,106	10,476	10,789	10,572	−17%	0%

Note: Years ending June 30. a Includes aqueous solutions. b Includes ammonium nitrate-limestone mixtures. c Adjusted for estimated quantity going into nonfertilizer uses. **Source:** Department of Agriculture.

PHOSPHATE: After two years of increases, production plummets

Thousands of tons (P_2O_5)	Production 1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual change 1985–86	Annual change 1976–86
Ammonium phosphate[a]	4984	6525	6156	5026	4434	6,243	5,519	5082	4548	4118	3380	−24%	4%
Concentrated superphosphate	1093	1145	1172	1184	1151	1,694	1,737	1901	1768	1750	1662	−5	−4
Normal and enriched superphosphate	70	102	113	110	153	376	384	320	303	376	414	−31	−16
All other	2434	2894	2170	1723	2080	2,613	2,372	2129	1626	1549	1743	−16	3
TOTAL	8581	10666	9611	8043	7818	10,926	10,012	9432	8245	7793	7199	−20%	2%

Note: Years ending June 30. a Liquid and solid, excluding that combined with potash salts in the process of manufacture. **Source:** Department of Agriculture

1 Production by the U.S. Chemical Industry

POTASH: Production in U.S. continues its long downhill slide

Thousands of tons (K_2O)	Production											Annual change	
	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
Potassium chloride	762	1107	1248	1456	1383	2007	1874	2082	1770	2098	1893	−31%	−9%
Potassium sulfate	255	271	370	368	413	481	565	402	371	451	385	−6	−4
All other	35	35	35	35	35	35	35	35	35	35	35	0	0
TOTAL	1052	1413	1653	1859	1831	2523	2474	2519	2176	2584	2313	−26%	−8%

Note: Years ending June 30. **Source:** Department of Agriculture

PESTICIDES: Production increased in 1985 but remained well below pre-1982 levels

Millions of lb	Production											Annual change	
	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1984–85	1975–85
Herbicides[a]	756	716	604	623	839	806	657	664	674	656	788	6%	0%
Insecticides[b]	370	350	306	379	448	506	617	605	570	566	660	6	−6
Fungicides	109	123	106	111	143	156	155	148	143	142	155	−11	−3
TOTAL	1235	1189	1017	1113	1430	1468	1429	1416	1388	1364	1603	4%	−3%

a Includes plant growth regulators. b Includes rodenticides, soil conditioners, and fumigants. **Source:** International Trade Commission

Paints and coatings shipments

COATINGS: Shipments have climbed since 1982

Millions of gal	Shipments								Change
	1986	1985	1984	1983	1982	1981	1980	1979	1985–86
Architectural	481	477	457	433	374	417	439	472	1%
Product[a]	339	317	336	294	280	312	316	351	7
Special purpose	148	145	145	130	129	129	135	116	2
TOTAL	968	939	938	857	783	858	890	939	3%

a For original equipment manufacturers. **Source:** Department of Commerce

AEROSOLS: Output rose last year, with personal, automotive, and industrial products strong

Millions of units	Production											Annual change	
	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
Personal products	952	879	832	747	628	645	637	772	729	720	981	8%	0%
Household products	635	630	603	586	556	575	580	653	628	600	532	1	2
Automotive and industrial products	375	342	337	303	286	302	310	300	275	230	185	10	7
Paints and finishes	297	290	307	300	295	313	310	302	309	331	306	2	0
Insect sprays	193	190	184	180	166	173	150	199	132	120	114	2	5
Food products	136	140	138	132	131	145	130	141	143	125	151	−3	−1
Animal products	22	15	16	19	19	14	15	18	15	18	16	47	3
Miscellaneous	18	23	15	15	13	28	30	14	a	5	10	−22	6
TOTAL	2628	2509	2433	2283	2096	2195	2163	2398	2232	2150	2295	5%	1%

a Not shown separately. **Source:** Chemical Specialties Manufacturers Association

CHLOROFLUOROCARBONS: U.S. production continues to rebound after late-70s slump

Millions of lb	Production											Annual change	
	1986[a]	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1985–86	1976–86
Chlorodifluoromethane (F-22)	274	235	254	236	174	252	227	211	206	179	170	17%	5%
Dichlorodifluoromethane (F-12)	322	302	337	290	258	325	295	294	327	358	393	7	−2
Trichlorofluoromethane (F-11)	201	176	185	215	140	163	158	167	194	213	256	14	−2
All other fluorinated hydrocarbons[b]	na	306	337	279	na	na	na	202	189	171	181	na	na
TOTAL	na	1019	1113	1020	na	na	na	874	916	921	1000	na	na

a Preliminary. b Includes other fluorohalogenated hydrocarbons. na = not available. **Source:** International Trade Commission

Chemical earnings stage a comeback

Although sales growth in the chemical industry in 1986 was lackluster at best, it was a good year for chemical firms in terms of profitability. Cost-cutting measures and production efficiencies that most chemical firms had instituted over the previous five years finally bore fruit.

The industry, by cutting its staffs, introducing streamlined processes, closing old and inefficient plants, and selling or closing marginally profitable or unprofitable businesses, cut its breakeven point drastically. As a result of this new operating leverage, a small rise in demand, and thus capacity use, can provide a large increase in profitability.

Another reason earnings grew faster than sales in 1986 is that raw materials were lower priced through much of the year. This was a two-edged sword, however, for although it gave companies a cost break, it also served to put pressure on prices as customers expected the lower costs to be passed through to them.

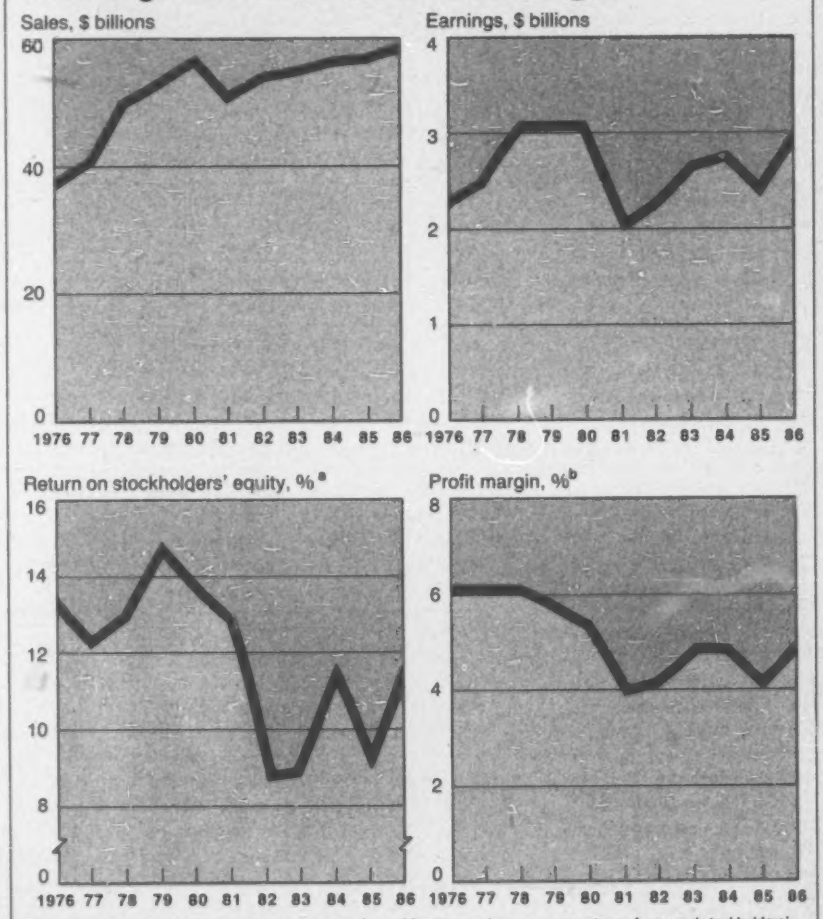
Sales were affected in much of 1986 by a string of problems that had been going on for some time. These include weak export markets and competition from imports for domestic sales. It was only in the latter half of the year that the foreign trade picture began to brighten. But when it did, the U.S. chemical trade surplus for 1986 was 8% higher than it was in 1985, ending a five-year slide. Although the trade surplus is not back to levels of the late 1970s, the improvement may foretoken improving exports during the next couple years.

Then, too, pricing was extremely poor, with prices for many chemicals ending the year lower than at the start. Besides pressure put on by customers for passthroughs of lower manufacturing costs, cheaper imports undercut prices for some of the year, and low demand in some U.S. markets also pulled overall prices down.

Some markets were still weak in 1986. Although many large-volume outlets for chemicals, such as plastics, picked up well, in line with rising demand in such end-use markets as autos and housing, others did not. Chief among these was the farm chemicals market; the long suffering agriculture economy put the squeeze on pesticides and, especially, fertilizers.

As a result, chemical industry sales rose only 3% from the year before, about in line with inflation in the U.S., but at least in contrast to the deflation in the industry itself. The earnings leverage in the industry, however, pushed earnings up 25%. Thus, profitability improved handsomely, with profit margins climbing to 5.0% from 4.0% in 1985 and return on stockholders' equity increasing to 11.7% from 9.0% the year before.

Profitability improved for major chemical producers last year as earnings rebounded on a modest sales gain



Note: Based on data for 30 major chemical companies. a After-tax earnings as a percentage of year-end stockholders' equity. b After-tax earnings as a percentage of sales.

TOP 100 CHEMICAL PRODUCERS: Rankings are shuffled as the industry changes its structure

Rank[a] 1986	1985		Chemical sales 1986 ($ millions)	Change from 1985	Chemical sales as % of total sales	Industry classification	Chemical operating profits[b] ($ millions)	Change from 1985	Chemical operating profits as % of total operating profits	Operating profit margin[c]	Identifiable chemical assets ($ millions)	Chemical assets as % of total assets	Operating return on chemical assets[d]
1	1	Du Pont	$11,839	5.2%	43.6%	Diversified	$1764	102.8%	52.1%	14.9%	$8739	36.2%	20.2%
2	2	Dow Chemical	8,863	−6.8	79.8	Basic chemicals	978	136.0	76.1	11.0	8139	66.5	12.0
3	3	Exxon	6,079	−8.9	8.1	Petroleum	817	112.2	9.9	13.4	5508	7.9	14.8
4	5	Union Carbide	5,001	26.3	78.8	Basic chemicals	748	81.1	94.6	15.0	5047	74.3	14.8
5	6	Atlantic Richfield	4,915	29.2	32.8	Petroleum	398	445.2	64.7	8.1	2085	9.7	19.1
6	4	Monsanto	4,701[e]	−9.6	68.3	Basic chemicals	696	87.8	141.1	19.1	3860	46.7	23.2
7	12	BASF Wyandotte	3,600[e]	38.5	100.0	Basic chemicals	na	na	na	na	na	na	na
8	7	Shell Oil	3,292	−0.8	19.6	Petroleum	648	292.7	35.1	19.7	3447	13.1	18.8
9	9	Amoco	2,928	0.8	14.5	Petroleum	467	55.0	23.0	15.9	2545	11.0	18.3
10	8	Celanese	2,891	−5.1	100.0	Basic chemicals	258	103.1	100.0	8.9	na	na	na
11	17	Allied-Signal	2,619	37.2	23.9	Diversified	346	77.4	32.9	12.3	2161	19.2	16.0
12	10	W. R. Grace	2,492	−13.1	66.9	Specialty chemicals	285	21.8	1187.5	11.4	1633	53.1	17.5
13	15	Mobil	2,391	5.5	4.8	Petroleum	205	153.1	4.5	8.6	2103	5.7	9.7
14	13	Eastman Kodak	2,379	1.3	20.6	Photo equipment	227	24.0	31.4	9.5	2266	17.6	10.0
15	11	Chevron	2,378	−8.9	9.1	Petroleum	147	def	20.6	6.2	3207	9.3	4.6
16	14	General Electric	2,331	−0.7	6.3	Diversified	424	−9.0	9.8	18.2	3602	10.4	11.8
17	22	Occidental Petroleum	2,088[f]	28.8	13.0	Petroleum	176	75.1	36.2	8.4	2393	13.7	7.3
18	18	Rohm & Haas	2,067	5.1	100.0	Basic chemicals	280	3.7	100.0	13.5	1470	100.0	19.0
19	19	American Cyanamid	1,821	−0.5	47.7	Basic chemicals	135	66.8	38.3	7.4	1275	49.6	10.6
20	21	Air Products[g]	1,798	7.4	90.7	Basic chemicals	363	16.2	129.4	20.2	2173	80.3	16.7
21	23	Mobay	1,710	6.9	100.0	Basic chemicals	150	0.1	100.0	8.8	na	na	na
22	20	Hercules	1,709	−2.0	65.4	Basic chemicals	101	114.9	49.5	5.9	1464	71.6	6.9
23	15	Phillips Petroleum	1,698	−25.1	17.0	Petroleum	299	36.5	30.3	17.6	1053	8.5	28.4
24	25	Borden	1,638	7.0	32.7	Dairy products	176	36.4	35.3	10.7	1399	40.3	12.6
25	24	Ciba-Geigy	1,490	−3.2	61.3	Specialty chemicals	na	na	na	na	na	na	na
26	26	Ashland Oil	1,477	−1.5	20.3	Petroleum	71	4.4	15.0	4.8	527	13.9	13.5
27	27	B. F. Goodrich	1,458	5.4	57.1	Rubber products	134	68.5	79.9	9.2	1199	82.5	11.1
28	29	FMC	1,399	11.0	46.6	Machinery	224	56.8	71.6	16.0	1344	50.0	16.7
29	28	American Hoechst	1,331[e]	−2.2	77.8	Basic chemicals	na	na	na	na	na	na	na
30	31	Texaco	1,279	4.8	4.0	Petroleum	91	658.3	3.9	7.1	1114	3.2	8.2
31	30	Ethyl	1,272	2.5	57.0	Basic chemicals	247	24.8	69.0	19.4	829	48.4	29.8
32	34	Olin	1,114	−2.9	65.3	Basic chemicals	80	72.7	50.3	7.2	840	59.6	9.5
33	37	National Distillers	1,087	4.7	62.8	Alcoholic beverages	124	72.6	67.0	11.4	1385	47.7	8.9
34	40	Dow Corning	1,085	20.4	100.0	Specialty chemicals	111[h]	16.2	100.0	10.2	na	na	na
35	36	International Minerals[i]	1,077	1.9	87.1	Agrochemicals	35	−74.2	57.1	3.2	2042	84.1	1.7
36	41	National Starch	1,064	20.7	100.0	Specialty chemicals	140	22.4	100.0	13.2	743	100.0	18.9
37	32	Unocal Corp.	1,056	−13.2	12.6	Petroleum	46[h]	−20.7	26.1	4.4	722	7.1	6.4
38	38	Borg-Warner	1,043	12.3	30.9	Auto equipment	153	25.3	43.8	14.7	562	23.6	27.3
39	44	Lubrizol	889	10.6	91.0	Specialty chemicals	140	49.5	108.6	15.7	589	67.1	23.7
40	42	PPG Industries	843[f]	0.2	18.0	Glass products	103	28.3	14.8	12.2	1185	25.5	8.7
41	85	Aluminum Co. of America	840[e]	209.6	18.0	Nonferrous metals	na	na	na	na	na	na	na
42	51	Pennwalt	777	14.2	70.1	Basic chemicals	93	57.3	78.8	12.0	649	73.8	14.3
43	49	Cabot[g]	769	7.9	58.7	Specialty metals	138	55.9	69.3	17.9	494	32.7	27.9
44	39	CF Industries	766	−16.8	100.0	Agrochemicals	−45	def	def	def	842	100.0	def
44	43	Reichhold Chemicals	766	−6.9	100.0	Basic chemicals	53	150.7	100.0	7.0	458	100.0	11.6
46	32	Aristech	751	−4.9	100.0	Basic chemicals	98	131.5	100.0	13.0	na	na	na
47	50	Nalco Chemical	736	7.9	100.0	Specialty chemicals	108	−11.0	100.0	14.7	586	100.0	18.4
48	58	NL Industries	734	30.1	57.2	Petroleum services	na	na	na	na	na	na	na
49	48	Eli Lilly	699	−2.0	18.8	Drugs	53	−39.8	5.8	7.6	766	16.7	6.9
50	54	Engelhard	666	11.3	29.1	Specialty metals	77	24.2	80.5	11.6	507	58.2	12.7

a Revised from C&EN, May 4. b Operating profit is sales less administrative expenses and cost of sales. c Operating profit from chemicals as a percentage of chemical sales. d Chemical operating profit as a percentage of identifiable chemical assets. e Chemical sales include significant amounts of nonchemical products. f Does not include all chemical sales. g Fiscal year ends Sept. 30. h Chemical net profits. i Fiscal year ends June 30. j Fiscal year ends Nov. 30. k Fiscal year ends Oct. 31. na = not available. def = deficit.

and attracts new entrants

Rank[a] 1986	1985		Chemical sales 1986 ($ millions)	Change from 1985	Chemical sales as % of total sales	Industry classification	Chemical operating profits[b] ($ millions)	Change from 1985	Chemical operating profits as % of total operating profits	Operating profit margin[c]	Identifiable chemical assets ($ millions)	Chemical assets as % of total assets	Operating return on chemical assets[d]
51	53	Morton Thiokol[j]	$652	5.8%	33.4%	Diversified	$ 87	−2.6%	33.9%	13.4%	$580	43.1%	15.1%
52	56	Terra Chemicals	626	9.0	100.0	Agrochemicals	na	na	na	na	na	na	na
53	64	International Flavors	621	23.9	100.0	Specialty chemicals	144	22.8	100.0	23.3	673	100.0	21.5
54	45	Williams Cos.	613	−17.4	33.0	Agrochemicals	na	na	na	na	na	na	na
55	52	Koppers	589	−4.8	42.2	Diversified	40	def	25.9	6.7	342	33.6	11.6
56	—	Georgia Gulf	583	−4.9	100.0	Basic chemicals	72	−2.6	100.0	12.4	265	100.0	27.3
57	47	Farmland Industries	574	−20.4	21.1	Agricultural supplies	−38	def	def	def	342	45.8	def
58	—	Huntsman Chemical	570	na	100.0	Basic chemicals	na	na	na	na	na	na	na
59	61	Vista Chemicals[g]	550	5.5	100.0	Basic chemicals	91	na	100.0	16.5	na	na	na
59	62	Soltex	550	6.8	100.0	Basic chemicals	na	na	na	na	na	na	na
61	56	Witco	544[f]	−5.2	40.1	Specialty chemicals	45	−21.3	34.0	8.2	275	33.6	16.2
62	63	Polysar	536	4.4	100.0	Basic chemicals	na	na	na	na	na	na	na
63	67	H. B. Fuller[j]	528	15.5	100.0	Specialty chemicals	39	26.5	100.0	7.5	291	100.0	13.6
64	66	Liquid Air	491	6.9	86.0	Basic chemicals	59	2.2	97.5	12.0	595	83.0	9.9
65	59	Standard Oil	475	−13.9	4.7	Petroleum	11	−59.3	1.5	2.3	347	2.2	3.2
66	65	Kerr-McGee	456	−5.7	18.0	Petroleum	14	−69.6	54.4	3.1	na	na	na
67	—	CBI Industries	451	2.6	39.0	Construction	60	−4.5	95.9	13.3	552	47.3	10.9
68	71	American Petrofina	441	9.0	22.5	Petroleum	53	358.4	def	12.0	250	14.5	21.3
69	—	Henley Group	435	14.5	13.7	Basic chemicals	60	def	def	13.8	359	7.6	16.7
70	74	Pfizer	416	6.0	9.3	Drugs	41	137.4	4.0	9.8	439	8.5	9.2
71	75	Tyler	388	3.4	40.4	Diversified chemicals	27	−8.9	51.1	7.0	187	37.2	14.5
72	73	Rhône-Poulenc	380	−5.0	100.0	Specialty chemicals	na	na	na	na	na	na	na
73	76	GAF	378	3.6	50.1	Specialty chemicals	108	16.4	77.5	28.6	252	18.7	42.8
74	68	Freeport-McMoRan	374	−17.1	59.4	Agrochemicals	76	−28.2	def	20.2	244	10.3	31.0
75	69	Merck	359	−20.3	8.7	Drugs	50	−14.4	4.8	13.9	431	11.7	11.6
76	79	Betz Laboratories	344	7.8	100.0	Specialty chemicals	63	4.6	100.0	18.4	270	100.0	23.5
77	72	Sun Co.	317	−21.1	3.0	Petroleum	na	na	na	na	na	na	na
78	77	Chemed	314	−6.6	87.4	Specialty chemicals	33	−23.8	82.7	10.5	162	82.6	20.3
79	84	Union Camp	305	10.9	14.9	Diversified	6	−30.3	2.6	2.0	227	8.3	2.7
80	83	Great Lakes Chemical	300	8.5	100.0	Specialty chemicals	43	−5.9	100.0	14.2	na	na	na
81	86	Ferro	286[e]	6.8	39.4	Specialty materials	22	62.0	37.4	7.8	162	41.4	13.7
82	90	Loctite	267	15.3	100.0	Specialty chemicals	37	5.5	100.0	13.8	244	100.0	15.1
83	—	Henkel	265	−8.0	100.0	Specialty chemicals	na	na	na	na	na	na	na
84	89	Stepan	260	10.1	100.0	Specialty chemicals	14	51.7	100.0	5.4	153	100.0	9.2
85	88	Kaiser Aluminum	254	−0.1	11.5	Nonferrous metals	34	333.3	60.0	13.3	284	8.8	11.9
85	81	Petrolite[k]	254	−12.5	90.7	Specialty chemicals	23	−36.8	94.6	9.0	158	68.8	14.4
85	80	Vulcan Materials	254	−13.2	26.5	Nonmetallic minerals	19	−19.9	12.1	7.7	na	na	na
88	91	Lonza	252	27.9	100.0	Specialty chemicals	na	na	na	na	na	na	na
89	82	Dexter Corp.	245	−12.9	37.6	Rubber products	23	−17.4	30.3	9.5	162	62.6	14.4
90	78	Mississippi Chemical[l]	228	−30.0	100.0	Farm cooperative	−13	def	def	def	265	100.0	def
91	95	Sigma-Aldrich	199	20.9	78.8	Specialty chemicals	53	11.5	84.4	26.4	207	84.4	25.5
92	93	Essex Chemical	184	6.8	89.4	Basic chemicals	32	0.0	115.3	17.4	105	76.3	30.5
93	99	Crompton & Knowles	165	46.1	77.2	Specialty chemicals	15	19.4	65.1	9.0	94	83.5	15.8
94	92	Georgia-Pacific	155	−10.4	2.1	Wood products	na	na	na	na	na	na	na
95	97	First Mississippi	153	1.2	56.8	Agrochemicals	20	−36.3	def	13.0	67	26.1	29.6
96	96	Agway	143	−11.8	4.1	Farm cooperative	na	na	na	na	na	na	na
97	—	Quaker Chemical	128	4.4	100.0	Specialty chemicals	14	11.3	100.0	10.8	99	100.0	14.0
98	98	UGI Corp.	113	−3.9	25.4	Natural gas	0	def	def	def	168	28.8	def
99	—	LeaRonal	105	−19.5	100.0	Specialty chemicals	10	−26.1	100.0	9.8	65	100.0	15.8
100	100	Lawter Chemicals	104	7.0	100.0	Diversified	20	49.0	100.0	19.0	93	100.0	21.1

FINANCIAL ANALYSIS: Most measures strengthened in 1986

		Profit margin[a]	Return on investment[b]	Debt as % debt plus equity	% total sales abroad[c]	% total assets abroad[d]	Sales per employee[e]	Dividends as % of net income	CAPITAL SPENDING[f] as % of sales	CAPITAL SPENDING[f] as % of net plant	R&D as % of sales	Sales as % of assets	Net plant as % of gross plant
SALES OVER $900 MILLION													
Air Products[g]	1986	6.9%	3.3%	38.9%	19.5%	25.0%	$119.4	32.9%	18.5%	20.0%	3.1%	73.3%	53.2%
	1985	7.8	3.8	30.9	17.3	18.8	97.8	26.6	21.4	22.0	2.8	70.5	56.1
American Cyanamid	1986	5.3	4.4	25.4	33.6	24.2	110.7	43.6	6.9	20.7	7.3	104.1	47.4
	1985	3.4	2.7	25.8	29.6	21.9	97.1	76.0	5.7	18.0	7.1	103.9	44.3
Cabot[g]	1986	5.6	4.1	41.9	38.4	16.9	198.5	35.4	5.5	11.3	2.6	86.8	53.0
	1985	5.1	4.1	37.9	26.8	15.7	182.8	41.4	10.1	22.7	2.3	88.3	56.3
Dow Chemical	1986	6.7	4.3	39.7	53.5	49.4	216.6	49.1	8.0	16.6	5.4	90.8	42.1
	1985	0.5	0.4	40.0	54.8	46.6	216.9	587.9	7.0	15.7	4.7	97.5	43.2
Ethyl	1986	11.3	10.7	30.2	19.6	8.7	150.4	24.0	8.5	22.5	3.0	92.1	49.3
	1985	7.6	7.5	33.6	28.3	9.2	147.3	31.7	5.8	16.1	3.0	99.4	50.6
B. F. Goodrich	1986	0.5	0.6	34.4	19.1	14.3	214.6	289.9	5.6	16.9	2.2	140.3	58.3
	1985	0.3	0.3	41.7	15.4	15.1	122.2	374.5	6.3	19.4	2.0	141.6	55.1
W. R. Grace	1986	1.2	0.9	45.6	32.3	16.9	90.0	263.0	5.3	12.6	2.5	90.9	48.3
	1985	2.5	1.9	38.8	25.4	16.4	58.3	111.7	6.7	13.4	1.8	95.8	57.1
Hercules	1986	8.7	6.8	24.3	21.1	15.4	104.1	41.4	9.8	22.3	2.7	89.7	51.4
	1985	5.1	4.4	26.5	25.0	14.9	101.7	64.9	9.1	23.4	2.9	97.3	50.1
International Minerals[h]	1986	def	def	48.1	13.2	9.7	84.7	def	8.0	7.5	2.8	48.5	57.7
	1985	7.3	4.4	23.9	17.3	8.3	187.0	59.5	7.1	10.3	na	83.1	52.3
Lubrizol	1986	8.0	7.1	8.4	51.6	31.8	203.4	59.3	4.1	14.0	5.2	111.3	45.0
	1985	6.7	5.7	12.4	47.7	29.5	173.7	78.1	4.4	13.6	4.8	105.7	48.3
Monsanto	1986	6.3	4.7	30.1	32.6	21.2	133.1	46.0	7.6	17.9	8.7	83.2	46.0
	1985	2.7	1.8	38.0	28.5	18.8	120.3	102.7	9.6	21.3	8.1	76.0	44.4
National Distillers	1986	3.2	1.8	37.6	na	na	na	136.1	5.9	7.3	na	59.6	71.9
	1985	3.4	3.3	23.2	na	na	na	96.9	3.3	8.5	na	113.3	60.0
Olin	1986	4.4	3.0	29.7	6.1	8.6	129.3	45.6	7.5	17.8	3.3	110.5	37.6
	1985	2.3	1.6	34.0	7.2	10.3	117.5	86.9	8.8	21.5	3.0	109.6	39.3
Pennwalt	1986	4.7	3.9	33.6	23.5	21.1	115.4	68.0	4.9	12.5	4.1	111.1	50.7
	1985	1.1	0.9	30.1	19.8	18.3	102.4	319.6	8.9	20.7	3.9	105.7	53.3
PPG Industries	1986	6.8	5.1	32.8	25.5	27.4	128.4	35.3	7.6	13.4	4.3	101.0	58.2
	1985	7.0	5.5	35.4	21.5	23.7	115.9	36.4	10.4	18.2	4.0	106.4	59.3
Rohm & Haas	1986	6.7	5.4	21.7	38.7	28.4	171.4	39.1	8.7	27.6	6.4	112.2	39.8
	1985	6.9	5.8	20.7	32.5	26.6	173.2	34.8	7.8	27.4	6.0	116.3	36.7
Union Carbide	1986	2.1	1.2	75.3	28.6	33.2	124.2	110.8	8.4	12.0	2.4	82.5	51.2
	1985	2.3	1.4	30.3	29.2	28.9	98.4	113.4	7.2	11.2	3.1	85.1	54.2
Witco	1986	4.8	5.5	17.0	16.7	15.8	169.4	35.9	4.4	16.3	1.6	165.3	47.8
	1985	3.9	4.3	24.7	14.0	13.5	na	38.4	4.9	19.7	na	178.8	39.3
MEDIAN 1986		5.5%	4.2%	33.2%	25.5%	21.1%	$129.3	44.6%	7.6%	16.5%	3.1%	91.5%	50.0%
MEDIAN 1985		3.7%	3.6%	30.6%	25.2%	18.6%	$116.9	77.1%	7.2%	18.8%	3.1%	101.7%	52.8%

Note: Net income is from continuing operations, excluding extraordinary and nonrecurring items where possible. a Net income as a percentage of sales. b Net income as a percentage of current assets plus gross plant. c Consolidated sales only. d Foreign identifiable assets as a percentage of total assets. e Thousands of dollars. f Actual spending on construction of new facilities and purchase of new equipment and land in consolidated businesses. g Fiscal year ended Sept. 30. h Fiscal year ended June 30. i Fiscal year ended Nov. 30. j Fiscal year ended Oct. 31. na = not available. def = deficit.

		Profit margin[a]	Return on investment[b]	Debt as % debt plus equity	% total sales abroad[c]	% total assets abroad[d]	Sales per employee[e]	Dividends as % of net income	CAPITAL SPENDING[f] as % of sales	as % of net plant	R&D as % of sales	Sales as % of assets	Net plant as % of gross plant
SALES LESS THAN $900 MILLION													
Betz Laboratories	1986	10.3%	11.1%	0.0%	15.4%	16.9%	$130.2	61.7%	6.6%	17.4%	3.8%	127.7%	61.2%
	1985	11.5	13.3	0.0	13.6	15.1	125.7	55.2	8.5	22.0	3.8	125.9	64.8
Chemed	1986	2.1	3.4	28.3	12.9	8.7	66.6	205.9	3.0	20.2	0.9	116.3	58.6
	1985	6.6	12.6	38.8	11.4	10.7	62.1	61.2	2.4	18.8	1.1	144.8	60.0
Crompton & Knowles	1986	4.2	5.8	22.2	14.4	24.6	162.7	50.6	1.6	12.3	2.1	158.2	49.4
	1985	3.3	5.1	20.6	17.2	21.9	na	57.9	1.5	11.2	2.0	178.0	50.1
Essex Chemical	1986	4.3	4.9	38.3	na	na	na	39.8	5.6	16.9	3.2	127.2	58.4
	1985	4.5	5.1	45.0	na	na	204.3	37.6	4.6	13.7	2.2	134.4	60.5
First Mississippi[h]	1986	2.6	1.4	36.7	13.6	na	407.4	66.2	11.8	20.3	1.9	88.4	36.0
	1985	6.7	3.7	32.5	12.6	na	373.7	26.9	23.2	27.0	na	69.1	57.3
Freeport-McMoRan	1986	4.1	0.9	42.0	na	na	na	156.0	19.5	6.6	na	26.7	69.4
	1985	15.4	4.1	41.6	na	na	160.5	22.6	28.7	12.8	na	35.1	66.9
H. B. Fuller[i]	1986	3.6	5.7	21.5	42.5	53.1	117.4	17.5	2.5	12.2	2.0	181.5	62.0
	1985	2.9	4.6	28.0	38.1	51.1	104.1	21.8	3.1	14.8	2.1	180.6	63.9
GAF Corp.	1986	10.7	8.2	44.4	15.3	6.8	na	4.3	4.5	16.3	1.5	56.0	63.2
	1985	7.4	7.4	45.5	12.2	6.0	170.2	7.6	6.4	24.3	1.4	83.3	63.0
Great Lakes	1986	8.9	5.1	43.0	21.6	na	na	1.1	6.1	8.7	3.5	61.1	63.1
	1985	10.4	7.6	15.9	19.5	na	na	24.0	7.7	15.5	3.4	85.7	57.2
International Flavors	1986	13.8	10.6	0.0	67.9	49.0	163.3	51.6	4.3	14.3	6.3	92.3	55.8
	1985	13.9	10.4	0.0	62.2	46.2	135.4	59.8	4.4	13.9	6.8	89.5	56.2
Lawter International	1986	12.5	12.0	7.8	41.7	38.2	279.7	76.0	1.5	7.1	2.2	110.8	49.1
	1985	def	def	9.2	34.1	33.7	na	def	3.3	14.1	2.2	115.2	53.4
Liquid Air	1986	6.1	3.8	41.9	35.7	38.7	130.0	70.0	22.9	27.5	1.8	79.5	59.9
	1985	5.8	3.7	35.1	34.9	33.6	123.4	67.5	19.1	24.8	1.8	85.7	58.8
Loctite[h]	1986	8.7	8.6	8.1	47.3	58.3	100.2	31.0	3.5	16.1	3.8	109.3	58.6
	1985	8.8	8.7	10.4	42.6	48.4	93.7	34.8	4.9	22.7	3.8	105.7	60.3
Nalco Chemical	1986	8.7	8.4	6.7	23.9	22.3	151.2	73.9	8.6	22.7	4.5	125.5	51.2
	1985	10.7	10.7	5.8	21.7	21.3	134.7	64.1	8.8	24.2	4.7	126.0	49.7
Petrolite[j]	1986	6.3	5.3	2.9	22.8	25.1	na	74.3	9.0	28.3	4.3	121.7	44.2
	1985	7.2	7.0	3.6	22.0	20.0	na	58.5	7.6	28.4	4.1	135.5	45.9
Reichhold Chemicals	1986	2.1	3.2	32.1	20.0	35.5	193.3	37.1	5.3	20.1	3.0	167.0	65.8
	1985	def	def	36.9	24.3	32.6	180.2	def	11.9	48.0	2.7	165.8	66.4
Sigma-Aldrich	1986	13.4	12.4	9.5	14.9	14.7	93.7	17.9	14.0	41.2	na	103.3	71.9
	1985	13.5	13.8	10.2	12.2	12.7	85.9	18.7	8.1	30.1	na	115.1	67.6
Stepan	1986	2.9	3.2	38.8	na	na	274.1	28.0	5.5	16.7	3.6	170.0	49.1
	1985	2.3	2.6	62.5	na	na	263.9	36.4	8.1	23.2	3.5	169.3	51.6
MEDIAN 1986		6.7%	5.7%	20.6%	21.9%	25.7%	$134.7	36.4%	7.6%	22.0%	3.1%	115.2%	59.8%
MEDIAN 1985		8.1%	7.7%	18.8%	18.9%	20.4%	$153.3	45.3%	3.9%	15.6%	2.7%	129.3%	59.9%

2 Finances of the U.S. Chemical Industry

Capital spending by U.S. chemical producers fell in 1986 as companies still had not put to work all their excess capacity to make product. For 26 chemical makers surveyed by C&EN, capital expenditures dropped 6% from the previous year. However, this decline was fueled not so much by an industrywide cutback in spending but rather by a few companies that sold off parts of their business and thus had less need to invest in new plants and equipment.

Chief among these are Union Carbide, W. R. Grace, and B. F. Goodrich. Carbide sold off a number of businesses, including agricultural chemicals. W. R. Grace sold its retailing operations and carried its fertilizer business as a discontinued operation in anticipation of selling it. And B. F. Goodrich spun off its tire operations into a joint venture with Uniroyal, which cut its capital needs in that area. Excluding these three companies, capital spending among major chemical firms last year would have been flat to slightly up from the year before.

For 1987, present signs suggest, capital spending in the chemical industry will remain little changed. C&EN's own capital spending survey indicates that expenditures on new plant and equipment in 1987 will be up only 1% over 1986. And the Commerce Department's latest survey shows that capital spending for the broader chemicals and allied products industry will increase just 0.5% in 1987.

INDUSTRY CAPITAL SPENDING: Chemical industry budgets only slight rise for 1987

$ Billions	1987[a]	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
Chemicals	$ 16.84	$ 16.75	$ 16.44	$ 15.32	$ 12.96	$ 12.66	$ 13.11	$ 11.63	$ 9.81	$ 7.76	$ 7.35
Iron and steel	4.66	3.35	4.12	3.54	3.25	3.78	3.48	3.44	3.21	2.60	2.88
Nonferrous metals	2.21	1.92	1.88	2.13	1.74	1.90	2.51	2.13	1.65	1.46	1.30
Paper	8.51	8.76	8.59	7.21	5.92	5.60	6.11	6.52	5.24	3.80	3.48
Petroleum	16.21	18.13	26.71	25.53	23.14	26.39	25.98	19.57	15.24	13.16	11.82
Rubber	3.62	3.92	3.86	3.11	2.46	2.16	2.15	2.03	2.46	2.33	1.77
Stone, clay, glass	3.35	3.13	3.40	3.09	2.77	2.90	3.41	3.98	3.99	3.15	2.30
All manufacturing	144.88	142.73	153.48	138.82	116.20	120.68	126.54	112.33	95.92	75.58	67.48

a Estimate. Source: Commerce Department

Backlog of unspent capital appropriations shrank in 1986

$ Billions	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Chemicals	$ 6.3	$ 8.0	$ 7.8	$ 7.5	$ 7.4	$ 9.4	$ 9.8	$ 8.5	$ 7.2	$ 7.4	$77.1
Iron and steel	0.4	1.1	2.1	2.2	2.7	5.4	5.9	4.5	4.0	3.6	4.7
Nonferrous metals	1.6	2.3	2.5	3.2	3.2	3.7	3.7	2.9	2.7	2.9	2.4
Paper	4.3	4.3	5.9	4.0	5.1	5.1	4.0	4.2	3.2	2.6	2.0
Petroleum	16.2	26.2	24.7	22.3	22.9	29.7	26.7	16.1	14.6	15.0	12.2
Rubber	2.0	3.1	1.6	1.1	1.0	0.9	1.0	0.9	0.9	0.8	0.7
Stone, clay, glass	1.8	2.0	2.2	1.5	1.6	1.9	2.0	2.3	2.4	2.0	1.5
All manufacturing	69.8	95.0	94.4	73.7	70.8	92.7	91.9	76.7	63.4	56.5	47.5

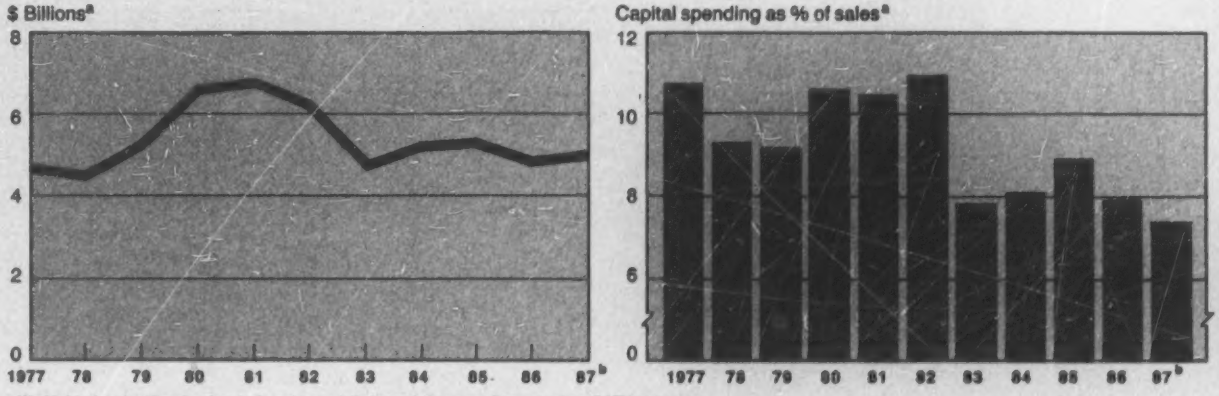
Note: Figures are for fourth quarter of each year. Source: Conference Board

Chemical industry's capital spending abroad continues to grow

$ Billions[a]	1987[b]	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
Chemicals & allied products	$ 3.6	$ 3.2	$ 2.7	$ 2.4	$ 2.3	$ 2.8	$ 3.0	$ 3.0	$ 2.6	$ 1.9	$ 2.0
Metals, primary & fabricated	0.8	0.9	0.9	1.0	0.9	1.0	0.8	0.9	0.6	0.6	0.5
Petroleum	10.8	11.1	13.7	14.1	15.9	20.8	15.8	14.8	11.0	9.5	8.9
All manufacturing	18	16.9	14.9	13.6	13.6	16.6	19.2	19.5	15.4	12.0	10.5

a By majority-owned foreign affiliates of U.S. companies. b Planned. Source: Commerce Department

Chemical capital spending is little changed and is falling as a percentage of sales



a Worldwide data for 12 major chemical producers. b Estimated. **Sources:** Company data, C&EN estimates

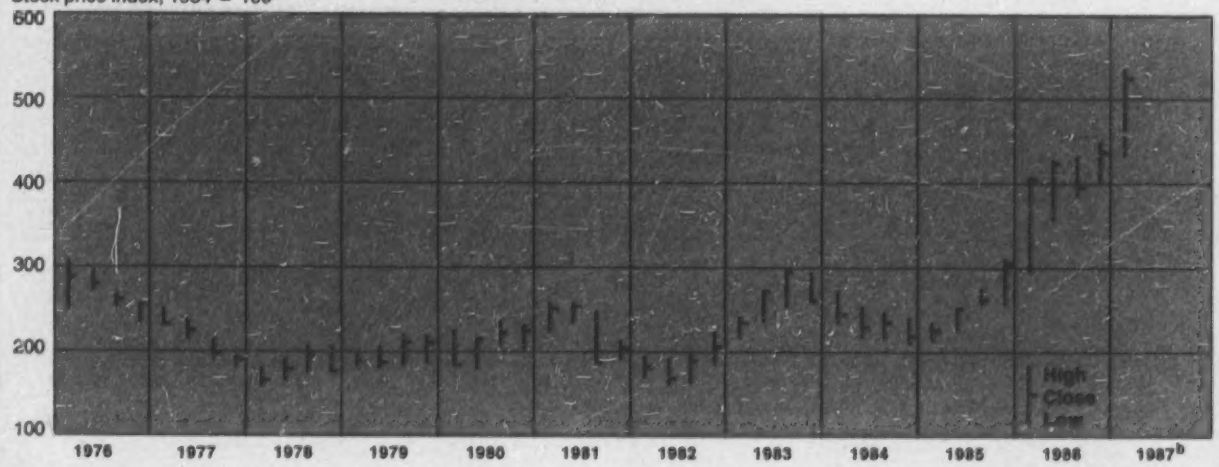
CHEMICAL CAPITAL SPENDING: Some companies made big cuts in 1986

$ Millions	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Air Products	$ 367	$ 392	$ 263	$ 246	$ 347	$ 323	$ 364	$ 246	$ 200	$ 143	$ 162
American Cyanamid	263	203	200	165	171	181	196	235	251	235	232
Chemed	9	7	9	5	4	4	4	6	3	3	3
Crompton & Knowles	4	3	3	2	3	7	10	8	5	2	2
Dow Chemical	890	806	781	630	829	1176	1184	1268	1075	1163	1200
Du Pont[a]	1587	1515	1319	1276	1300	1420	1297	864	714	704	876
Essex Chemical	12	9	7	11	25	10	6	4	4	2	5
Ethyl	134	90	103	85	92	141	156	123	96	88	88
B. F. Goodrich	144	202	153	115	144	205	184	192	115	106	86
W. R. Grace	199	348	380	353	560	657	658	514	313	279	234
Great Lakes Chemical	18	21	29	20	29	47	21	18	9	12	6
Hercules	257	234	218	168	174	167	229	186	116	127	150
Loctite	9	11	6	10	11	13	14	9	6	4	2
Lubrizol	41	40	30	25	52	75	92	51	44	23	19
Monsanto	520	645	614	560	673	668	781	566	480	607	647
Nalco Chemical	64	60	53	41	56	59	35	39	34	33	13
National Distillers	102	76	116	71	66	44	49	58	106	88	43
Olin	128	154	165	123	129	186	172	161	163	208	166
Pennwalt	54	90	87	70	76	53	53	66	61	45	40
Petrolite	25	24	11	9	24	15	17	12	7	21	19
PPG Industries	356	452	315	450	452	376	401	252	261	212	177
Reichhold Chemicals	41	35	24	19	21	16	23	26	24	26	22
Rohm & Haas	179	159	124	72	126	182	93	68	66	79	110
Stepan	14	19	12	10	16	12	9	14	14	16	8
Union Carbide	524	649	670	761	1179	1186	1129	831	688	805	965
Witco	60	76	85	55	54	83	73	49	51	29	27
TOTAL	$6001	$6320	$5777	$5352	$6611	$7307	$7250	$5864	$4904	$5061	$5302
ANNUAL CHANGE	−5%	9%	8%	−19%	−10%	1%	24%	20%	−3%	−5%	8%

Note: Figures are for worldwide spending on construction, equipment, and land in consolidated businesses. Where possible, acquisition costs and investments in nonconsolidated businesses are excluded. a Excludes Conoco. **Source:** Company data

2 Finances of the U.S. Chemical Industry

Prices of chemical stocks surge higher in recent bull market



a C&EN weighted stock price index of American Cyanamid, Dow Chemical, W. R. Grace, Hercules, Monsanto, Rohm & Haas, and Union Carbide; weighted according to number of shares outstanding for each company. b First quarter.

SHIPMENTS: Like industry as a whole, chemicals showed no growth in 1986

$ Billions	1986[a]	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual change 1985–86	Annual change 1976–86
All manufacturing industries	$2347.6	$2341.2	$2274.9	$2047.4	$1910.1	$1994.6	$1851.0	$1727.2	$1523.4	$1358.4	$1185.6	0%	7%
Chemicals and allied products	214.0	214.3	211.8	190.2	172.8	175.1	161.6	147.7	129.8	118.2	104.1	0	7
Industrial chemicals[b]	70.4	71.6	68.7	59.1	55.8	60.7	56.4	52.3	44.8	41.5	35.6	−2	7
Drugs, soap, and toiletries	61.8	56.1	53.9	50.4	48.6	44.1	41.9	36.7	34.7	30.6	27.8	10	8
Petroleum and coal products	143.0	194.0	200.6	191.6	206.4	220.3	198.7	148.4	103.9	97.5	82.3	−26	6
Rubber and plastic products, nec	47.7	48.2	52.1	50.3	50.2	46.5	47.3	46.8	43.2	39.6	31.8	−1	4
Paper and allied products	109.4	97.6	95.9	85.1	79.0	79.5	72.6	65.2	57.0	52.1	48.2	12	9

a Preliminary. b excluding pigments. nec = not elsewhere classified. Source: Department of Commerce

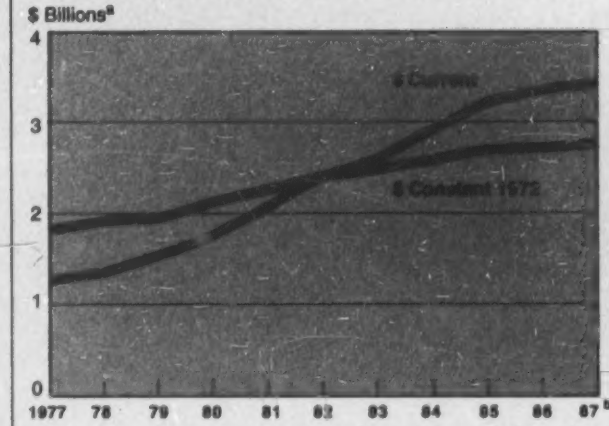
PRICES: Drugs and paint buck an overall decline for chemical products

Producer price indexes,[a] 1967 = 100	1986[b]	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	Annual average: Annual change 1985–86	Annual average: Annual change 1976–86
All commodities	299.8	308.7	310.3	303.1	299.3	293.4	268.8	235.6	209.3	194.2	183.0	−3%	5%
Industrial commodities	312.1	323.8	322.6	315.8	312.3	304.1	274.8	236.5	209.4	195.1	182.4	−4	6
Chemicals and allied products	299.7	303.2	300.8	292.9	292.4	287.6	260.3	222.3	198.8	192.8	187.2	−1	5
Industrial chemicals	322.5	338.3	341.3	342.9	353.0	363.3	324.0	264.0	225.6	223.9	219.3	−5	4
Prepared paint	281.2	276.8	272.5	264.7	262.9	249.8	235.3	204.4	192.3	182.4	174.4	2	5
Paint materials	318.0	333.7	329.7	305.6	304.6	300.1	273.9	241.2	212.7	205.9	189.8	−5	5
Drugs and pharmaceuticals	272.8	256.3	240.0	226.2	210.1	193.5	174.5	159.4	148.1	140.5	134.0	6	7
Fats and oils, inedible	215.1	295.3	371.4	283.7	267.1	295.6	298.0	376.7	315.8	279.0	249.9	−27	−1
Agricultural chemicals and chemical products	275.5	281.3	284.8	280.7	292.7	285.0	257.1	214.4	198.4	187.8	188.4	−2	4
Plastic resins and materials	295.9	304.7	308.6	290.2	283.3	289.2	279.2	235.9	199.8	195.7	194.0	−3	4
Other chemicals and allied products	285.9	284.2	277.5	273.7	269.8	254.2	224.5	191.8	181.8	175.7	170.7	1	5
Rubber and plastics products	246.0	245.9	246.8	243.4	241.6	232.6	217.4	194.3	174.8	167.6	159.2	0	4

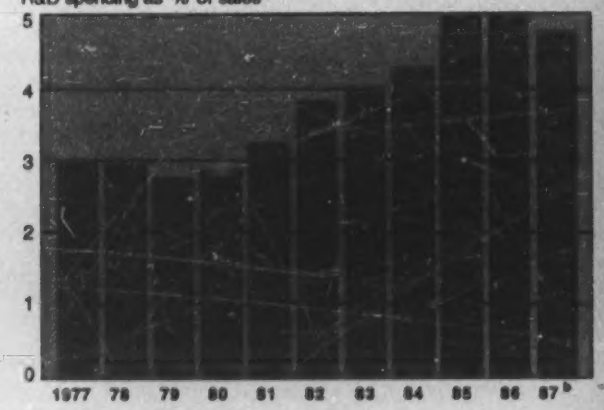
a Formerly called "wholesale price indexes." b Preliminary. Source: Department of Labor

2 Finances of the U.S. Chemical Industry

Chemical producers' R&D spending is increasing moderately . . .



. . . but will fall relative to their sales, for the first time in the 1980s



a R&D spending by 12 major chemical producers. b Estimated. Sources: Company data, Battelle Columbus Laboratories, C&EN estimates

R&D SPENDING: Relatively modest increases last year for chemical producers

$ Millions	1988	1986	1984	1983	1982	1981	1980	1979	1978	1977	1976
CHEMICAL COMPANIES											
Air Products	$ 61	$ 51	$ 44	$ 40	$ 37	$ 32	$ 30	$ 24	$ 23	$ 24	$ 19
American Cyanamid	278	251	232	208	185	166	148	130	108	96	83
Dow Chemical	605	547	507	492	460	404	314	269	232	203	188
Ethyl	47	47	40	39	39	37	34	29	25	28	25
W. R. Grace	94	92	81	73	64	57	45	42	37	32	28
Hercules	71	76	72	74	74	65	57	50	43	40	37
International Flavors	39	34	32	32	31	30	29	27	24	20	16
Lubrizol	51	44	33	37	36	33	28	23	21	19	17
Monsanto	596	470	370	290	264	233	208	161	136	132	114
Nalco Chemical	33	32	32	30	33	30	28	21	17	14	12
Olin	56	53	52	49	45	38	31	26	25	25	23
Pennwalt	45	39	36	33	31	27	24	22	23	21	19
Petrolite	12	12	12	13	10	8	7	6	5	5	4
PPG Industries	204	176	150	127	127	119	103	83	70	61	56
Rohm & Haas	133	124	109	100	92	77	67	54	49	45	43
Union Carbide	148	275	265	245	240	207	166	161	158	156	143
TOTAL	$2474	$2323	$2066	$1881	$1768	$1563	$1318	$1128	$993	$ 920	$827
ANNUAL CHANGE	6%	12%	10%	6%	13%	19%	17%	14%	8%	11%	9%
PHARMACEUTICAL & DIVERSIFIED COMPANIES											
Allied-Signal	734	470	389	383	177	152	105	70	58	51	42
Du Pont	1156	1144	1097	966	879	716	591	509	461	367	353
Eastman Kodak	1059	976	836	746	710	615	520	459	389	351	335
Eli Lilly	427	370	341	294	267	235	201	178	150	127	114
FMC	146	149	121	102	105	94	81	69	54	44	41
Merck	460	426	393	356	320	274	234	188	161	145	134
Morton Thiokol	38	34	28	21	7	6	6	5	4	4	4
Pfizer	336	287	255	230	199	179	162	139	117	101	91
Upjohn	314	284	247	218	185	162	139	122	109	96	87
TOTAL	$4669	$4140	$3709	$3315	$2850	$2434	$2038	$1740	$1501	$1286	$1200
ANNUAL CHANGE	13%	12%	12%	16%	17%	19%	17%	16%	17%	7%	6%

Source: Company data

2 Finances of the U.S. Chemical Industry

INDUSTRY BALANCE SHEET: Increase in current assets is balanced by rise in debt

Industrial chemicals and synthetics

Assets	1986 ($ billions)	1985 ($ billions)	Change
Current assets			
Cash and U.S. bank deposits	$ 2.52	$ 1.32	92%
Short-term securities	0.95	1.14	−16
Receivables	11.69	12.33	−5
Inventories	11.21	10.76	4
Other current assets	3.16	2.50	26
Total	**29.54**	**28.05**	**5**
Fixed assets			
Depreciable fixed assets	77.42	76.21	2
Land and mineral rights	2.87	2.98	−4
Less: accumulated depreciation and depletion	41.51	40.19	3
Net fixed assets	**38.78**	**39.00**	**−1**
Other assets, including investments and intangibles	**22.76**	**21.80**	**4**
TOTAL ASSETS	**$91.08**	**$88.85**	**3%**

Liabilities and stockholders' equity	1986 ($ billions)	1985 ($ billions)	Change
Current liabilities			
Short-term debt	$ 3.27	$ 3.27	0%
Accounts payable	5.76	5.90	−2
Accrued income taxes	1.31	1.05	3
Current portion of long-term debt	0.85	1.03	−18
Other current liabilities	8.87	9.40	−6
Total	**20.06**	**20.64**	**−3**
Long-term debt	**20.87**	**19.21**	**9**
Other noncurrent liabilities, including deferred taxes and minority interest	**8.53**	**8.19**	**4**
TOTAL LIABILITIES	**49.45**	**48.04**	**3**
Stockholders' equity			
Capital stock and other capital	14.91	13.90	2
Retained earnings	26.72	26.92	−1
TOTAL STOCKHOLDERS' EQUITY	**41.63**	**40.82**	**2**
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	**$91.08**	**$88.85**	**3%**

Source: Bureau of the Census

DEBT RATIOS: Rising to relatively high levels for chemical companies

$ Billions	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
INDUSTRIAL CHEMICALS AND SYNTHETICS											
Long-term debt	$20.9	$19.2	$18.1	$19.4	$22.0	$21.4	$16.8	$14.8	$13.6	$12.3	$11.8
Stockholders' equity	$41.6	$40.8	$46.5	$45.3	$45.9	$42.5	$39.8	$32.3	$29.3	$26.3	$25.0
Debt ratio[a]	33.4%	32.0%	28.0%	30.0%	32.4%	33.5%	29.6%	31.4%	31.8%	31.9%	32.0%
CHEMICALS AND ALLIED PRODUCTS											
Long-term debt	$45.8	$38.2	$33.8	$36.2	$38.2	$36.9	$28.3	$24.9	$23.5	$21.1	$19.4
Stockholders' equity	$100.0	$100.3	$100.3	$97.2	$95.3	$89.9	$79.5	$67.4	$60.8	$54.9	$50.8
Debt ratio[a]	31.4%	27.6%	25.2%	27.2%	28.6%	29.1%	26.3%	27.0%	27.9%	27.8%	27.6%
ALL MANUFACTURING											
Long-term debt	$412.2	$367.0	$324.2	$286.6	$293.1	$266.5	$236.2	$204.8	$182.0	$167.3	$153.6
Stockholders' equity	$888.4	$870.7	$883.6	$837.6	$783.0	$762.3	$699.7	$624.0	$560.8	$511.7	$475.3
Debt ratio[a]	31.7%	29.6%	26.8%	25.5%	27.2%	25.9%	25.2%	24.7%	24.5%	24.6%	24.4%

Note: Because of changes in accounting rules and industry classifications, numbers over the entire range of years are not strictly comparable. a Long-term debt as a percentage of long-term debt plus stockholders' equity. **Source:** Bureau of the Census

CASH FLOW: Cost and revenues from restructuring have a major impact for second year in a row

$ Millions, % of total	1986		1985		1984		1983		1982	
SOURCES OF FUNDS										
Net income	$ 3,414	13.6%	$ 986	6.5%	$ 3,859	29.7%	$ 2,795	23.1%	$ 2,750	21.4%
Depreciation and depletion	5,117	20.4	5,010	32.8	4,710	36.2	4,601	38.0	4,341	33.8
Deferred taxes	568	2.3	−34	−0.2	507	3.9	333	2.7	623	4.8
Other internal sources	6,084	24.3	6,707	43.9	2,357	18.1	2,623	21.7	2,062	16.0
Long-term debt	8,773	35.0	2,356	15.4	1,441	11.1	1,352	11.2	2,655	20.6
Stock	1,091	4.4	264	1.7	136	1.0	396	3.3	432	3.4
TOTAL	**$25,047**	**100.0%**	**$15,289**	**100.0%**	**$13,009**	**100.0%**	**$12,100**	**100.0%**	**$12,864**	**100.0%**
APPLICATIONS OF FUNDS										
Dividends	$ 1,992	8.0%	$ 2,049	13.4%	$ 1,998	15.4%	$ 1,868	15.4%	$ 1,791	13.9%
Capital expenditures	5,986	23.9	6,500	42.5	6,400	49.2	5,685	47.0	7,370	57.3
Additions to working capital	−567	−2.3	49	0.3	−436	−3.4	−265	−2.2	−1,402	−10.9
Reduction of long-term debt	7,669	30.6	2,555	16.7	2,529	19.4	3,249	26.9	3,592	27.9
Other applications	9,966	39.8	4,137	27.1	2,518	19.4	1,563	12.9	1,512	11.8
TOTAL	**$25,047**	**100.0%**	**$15,289**	**100.0%**	**$13,009**	**100.0%**	**$12,100**	**100.0%**	**$12,864**	**100.0%**

Note: Data are totals for 12 major chemical producers: American Cyanamid, Dow Chemical, Du Pont, Ethyl, W. R. Grace, Hercules, Monsanto, National Distillers, Olin, Pennwalt, Rohm & Haas, and Union Carbide. **Sources:** Company annual reports

2 Finances of the U.S. Chemical Industry

The makeup of the U.S. chemical industry has changed markedly during the past year or so. Some well-known names have exited the industry, as least as independent companies. Meanwhile, several new corporate names have appeared on the chemical scene.

The biggest name now missing from the rolls of the chemical industry is Celanese, acquired early this year for $2.85 billion by American Hoechst, the U.S. subsidiary of West Germany's giant Hoechst Group. Last year, France's Air Liquide, to broaden its industrial gas operations in the U.S., acquired Big Three Industries for a little more than $1 billion. At the end of the year, Sun Chemical sold off its printing inks and pigments operations to Japan's Dainippon Inks & Chemicals for $550 million and subsequently changed its name to Sequa Corp. to mark its departure from chemically based products. And early this year, Williams Cos. finished the disposal of its fertilizers business with the sale of its Agrico Chemical Co. to Freeport-McMoRan Resource Partners.

New players in the chemical industry that became publicly owned late last year include Aristech Chemical, formerly the USS Chemicals division of USX (formerly U.S. Steel); Vista Chemical, formed via the leveraged buyout of some of the chemical operations of the Conoco subsidiary of Du Pont; and Georgia Gulf, previously the commodity chemicals division of Georgia-Pacific. Another new kid on the block is Himont, a joint venture in polypropylene between Hercules and Italy's Montedison, that since last February has had 20% of its stock in the hands of the public.

Explanation of table headings

Year. Data are for calendar year unless otherwise indicated.

Net sales. Gross sales, less discounts, allowances, and returns; generally excludes excise taxes and other operating income or revenues.

Net income. Net sales and other income, less operating costs, nonoperating charges, depreciation, depletion, interest expense, deferred charges, minority interest in income, and taxes. Nonrecurring or extraordinary credits and charges have been excluded in most cases, but these items are indicated by a footnote.

Total assets. Sum at year's end of current assets, investments, prepaid expenses, net plant and equipment, and other tangible assets. Excludes insofar as possible intangible assets including goodwill, value of patents and trademarks, and the like.

Current ratio. The ratio of current assets (cash, marketable securities, receivables, and inventories but excluding prepaid expenses) to total current liabilities.

Net plant and equipment. Value at year's end of fixed assets, less accumulated depreciation, amortization, and depletion.

Capital expenditures. Total spending during the year for new fixed assets, such as plant, equipment, and land, and for replacement and modernization of facilities.

Net worth. Equity at year's end of preferred and common stock holders, including value of capital stock, capital and earned surplus, and surplus reserves, as well as contingency and miscellaneous reserves for which no definite purpose is stated. Intangible assets are deducted insofar as possible.

Net income (breakdown). Per cent of sales: net income divided by net sales. **Per cent of net worth:** net income divided by tangible net worth. **Dollars per share:** net income, less preferred dividends, divided by the number of shares of common stock outstanding. All figures are adjusted for stock splits, but no adjustment has been made for earlier years as a result of stock dividends or for dilution that might result from the conversion of preferred stock or debt to common stock or the exercise of stock options outstanding.

Dividends per share. Cash dividends paid (or declared) on each share of common stock; excludes the value of stock dividends, which are indicated by a footnote.

Dividend yield. Dividends per share divided by the average of the high and low prices of the common stock during the calendar year.

Stock price range. High-low market prices of common stock during the calendar year, adjusted for stock splits but not for stock dividends.

Price-earnings ratio. Average of the high and low prices of the common stock during the calendar year divided by net income per share.

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME: % of sales	NET INCOME: % of net worth	NET INCOME: $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
CHEMICALS														
Air Products & Chemicals														
1986[b]	$1,982,134	$ 4,735[b]	$2,700,151	1.4	$1,829,122	$366,563	$1,094,562	0.2%	0.4%	$0.08[b]	$0.77	2.2%	$41⅛–29⅛	442.2
1985[c]	1,829,588	143,484[c]	2,539,545	1.1	1,782,267	392,176	1,109,068	7.8	12.9	2.38[c]	0.635	2.3	34½–22¼	11.9
1984[d]	1,735,115	140,818	2,267,457	1.1	1,587,382	262,491	1,058,328	8.1	13.3	2.28	0.525	2.5	24½–18⅛	9.3
1983[d]	1,634,246	108,963	2,186,167	1.1	1,541,345	246,417	988,256	6.7	11.0	1.78	0.45	2.1	25½–17	12.0
American Cyanamid Co.														
1986	$3,815,900	$202,500	$3,482,400	1.7	$1,267,700	$262,500	$1,536,000	5.3%	13.2%	$4.38	$1.90	2.6%	$80⅞–54⅛	16.5
1985	3,536,100	120,209[e]	3,383,400	2.0	1,126,900	202,600	1,623,000	3.4	7.4	2.50[e]	1.90	3.5	58¼–48	21.4
1984	3,856,726	215,918	3,304,027	1.9	1,241,927	290,110	1,645,122	5.6	13.1	4.41	1.86	3.9	53⅛–42⅛	10.8
1983	3,535,514	188,356	3,031,311	2.1	1,256,858	185,068	1,578,875	4.7	10.5	3.41	1.75	3.8	58 –33⅛	13.6
Aristech Chemical Corp.														
1986[f]	$ 750,800	$ 47,600	$ 476,100	1.9	$ 286,300	$ 15,600	$ 309,700	5.3%	15.4%	$1.70[f]	$0.00	0.0%	$18⅝–17⅛[g]	10.7
1985	730,100	20,500	452,400	2.5	303,200	17,900	282,900[h]	2.8	7.8	0.85[f]	—	—	—	—
1984	882,300	42,800	465,800	—	—	9,100	270,600[h]	4.9	15.7	—	—	—	—	—
1983	999,600	2,900	465,300	—	—	—	268,400[h]	0.4	1.0	—	—	—	—	—
Betz Laboratories														
1986	$ 344,377	$ 35,544	$ 298,917	2.3	$ 144,053	$ 22,750	$ 204,040	10.3%	17.4%	$2.23	$1.36	3.4%	$44⅝–35	17.9
1985	319,381	36,792	253,704	2.2	137,255	27,030	194,793	11.5	18.9	2.33	1.26	3.7	38⅛–30⅛	14.7
1984	303,898	36,737	220,662	2.1	123,298	25,302	170,684	12.1	21.5	2.33	1.10	3.3	39 –27⅛	14.2
1983	288,983	33,100	204,174	2.1	113,872	32,765	161,768	12.4	20.5	2.08	0.94	2.4	44⅜–32⅛	18.5

a Fiscal year ends Sept. 30. b Includes special charges for writedown of assets, revaluation of South African investment, and staff reduction program of $132.2 million ($2.25 per share) and for loss of investment tax credits of $7 million ($0.13 per share). c Includes special charges, before taxes, of $300,000. d From continuing operations; excludes net income and gain of sale of Formica Brand Products Group of $8.9 million ($0.16 per share). e Aristech Chemical, previously the USS Chemicals division of USX Corp., became an independent, publicly owned company Dec. 4. f Pro forma. g From initial public offering Dec. 4. h UXS Corp. equity investment.

2 Finances of the U.S. Chemical Industry

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME: % of sales	NET INCOME: % of net worth	NET INCOME: $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Cabot Corp.														
1986[a]	$ 1,309,915	$ 33,061[b]	$ 1,490,759	2.0	$ 942,137	$ 75,551	$ 572,145	5.6%	12.8%	$2.56	$0.92	3.1%	$35½–23⅜	11.5
1985[a]	1,407,516	71,290[c]	1,573,086	1.9	823,211	141,559	604,085	5.1	11.8	2.22[c]	0.92	3.4	33⅛–20½	12.2
1984[a]	1,752,523	97,073	1,730,722	1.8	1,051,251	116,911	699,167	5.5	13.9	3.02	0.92	3.6	28⅞–22⅝	8.5
1983[a]	1,558,016	64,162	1,2[illegible]340	2.6	656,894	76,964	658,838	4.1	9.7	2.00	0.92	3.8	30⅞–20½	12.8
Chemed Corp.														
1986	$ 359,476	$ 6,830[d]	$ 229,316	1.7	$ 46,554	$ 9,385	$ 75,339	1.9%	9.1%	$0.78[d]	$1.56	4.4%	$ 40–30⅛	46.1
1985	372,677	21,858	197,615	1.7	42,092	7,874	58,234	6.6	37.5	2.49	1.52	5.1	33⅛–25⅝	11.9
1984	346,140	20,110	180,518	1.7	45,517	9,198	49,822	5.8	40.4	2.29	1.48	4.7	38⅝–25⅝	13.6
1983	271,343	17,371[e]	174,248	1.9	35,012	5,703	58,420	6.4	29.7	2.17	1.36	3.8	39⅝–32	16.4
Crompton & Knowles Corp.														
1986	$ 213,242	$ 8,923[f]	$ 126,881	2.2	$ 28,511	$ 3,514	$ 60,565	4.2%	14.5%	$2.65[f]	$1.26	4.0%	$30⅛–24½	12.0
1985	231,225	7,575	120,076	2.5	30,376	3,382	63,830	3.3	11.9	2.20	1.20	5.3	27⅛–18⅝	10.3
1984	230,434	7,891	114,135	2.5	30,809	3,917	59,586	3.4	13.2	2.31	1.14	5.3	23¾–19⅛	9.3
1983	230,560	6,302	115,536	2.6	31,205	2,954	57,893	2.7	10.9	1.81	1.06	4.6	28⅞–16⅜	12.6
Dow Chemical Co.														
1986	$11,113,000	$ 741,000[g]	$11,939,000	1.6	$ 5,347,000	$ 890,000	$ 4,865,000	6.7%	15.2%	$3.87[g]	$1.85	3.8%	$81⅛–39⅞	13.1
1985	10,500,000	58,000	11,565,000	1.5	5,127,000	806,000	4,527,000	0.6	1.3	0.31	1.80	5.2	41⅞–27	111.1
1984	10,679,000	549,000[h]	11,217,000	1.5	5,173,000	781,000	4,860,000	5.1	11.3	2.83[h]	1.80	6.0	34½–25⅝	10.6
1983	10,442,000	293,000[i]	11,785,000	1.4	5,695,000	630,000	4,851,000	2.8	6.0	1.50[i]	1.80	5.7	38⅝–25	21.1
E. I. du Pont de Nemours & Co.														
1986	$27,146,000	$1,538,000	$26,733,000	1.5	$15,697,000	$2,737,000	$13,374,000	5.7%	11.5%	$8.35	$3.05	4.0%	$92½–59½	12.0
1985	29,483,000	1,118,000	25,140,000	1.6	15,195,000	3,046,000	12,659,000	3.8	8.8	4.61	3.00	5.1	69⅝–47⅞	12.7
1984	35,915,000	1,431,000	24,098,000	1.6	14,409,000	2,931,000	12,233,000	4.0	11.7	5.93	2.90	6.1	52⅞–42⅝	8.0
1983	35,378,000	1,127,000	24,432,000	1.7	14,261,000	2,628,000	11,472,000	3.2	9.8	4.70	2.50	5.5	55–35½	9.6
Essex Chemical Corp.														
1986	$ 205,624	$ 8,836	$ 159,499	1.3	$ 68,838	$ 11,614	$ 57,336	4.3%	15.4%	$1.44	$0.57	2.5%	$29⅝–16	15.8
1985	190,049	8,502	140,195	2.1	64,161	8,788	50,617	4.5	16.8	1.40	0.52	3.3	19½–12⅛	11.3
1984	175,833	8,092[j]	135,654	2.2	62,469	6,848	44,885	5.2	20.3	1.50	0.47	3.5	15⅝–10⅜	8.8
1983	150,509	5,639[k]	145,011	2.3	63,448	10,711	41,690	3.7	13.5	0.92	0.42	2.7	18¼–12½	16.7
Ethyl Corp.														
1986	$ 1,579,254	$ 177,734	$ 1,667,825	2.1	$ 594,238	$ 133,700	$ 895,790	11.3%	19.8%	$1.40	$0.335	1.8%	$22⅞–13½	12.9
1985	1,547,034	117,148[l]	1,509,988	2.0	557,256	89,512	754,853	7.6	15.5	0.92	0.285	2.5	15¼–7⅞	12.6
1984	1,675,059	132,184[m]	1,437,207	2.2	573,156	103,416	707,716	7.9	18.7	0.86	0.21	3.2	8¼–5	7.7
1983	1,745,193	106,038[n]	1,449,982	2.0	626,461	84,723	811,290	6.1	13.1	0.65	0.21	3.9	7⅛–3⅜	8.4
Ferro Corp.														
1986	$ 725,241	$ 24,062	$ 443,801	1.9	$ 153,712	$ 23,566	$ 217,750	3.3%	11.1%	$3.54	$1.20	3.4%	$41⅝–30¼	10.1
1985	651,071	11,163[o]	391,133	2.0	145,651	27,050	193,850	1.7	5.8	1.68[o]	1.20	3.9	37–24⅛	18.4
1984	662,867	16,886	359,938	2.0	136,462	29,354	185,963	2.5	9.1	2.53	1.20	4.0	38½–22⅛	12.0
1983	619,179	19,228	364,861	1.9	132,509	20,252	185,337	3.1	10.4	3.04	1.20	3.7	30½–24⅜	10.8
First Mississippi Corp.														
1986[p]	$268,898	($28,110)[q]	$ 287,562	1.6	$ 155,266	$ 31,635	$ 125,521	—	—	($1.42)[q]	$0.24	3.6%	$ 8⅛–5¼	—
1985[p]	273,185	18,239[r]	378,587	1.5	234,574	63,257	165,330	6.7%	10.1%	0.90[r]	0.24	2.6	11⅝–6⅝	10.1
1984[p]	270,004	15,845[s]	380,855	1.5	209,742	41,034	166,957	5.9	9.5	0.77[s]	0.24	2.3	13⅜–7⅛	13.6
1983[p]	203,976	14,146	379,436	1.2	200,990	47,428	155,055	6.9	9.1	0.69	0.24	2.0	15½–8¼	17.2
GAF Corp.														
1986	$ 753,774	$ 80,686[t]	$ 1,347,068	3.9	$ 208,396	$ 33,914	$ 601,496	10.7%	13.4%	$2.22[t]	$0.10	0.3%	$ 44–23⅞	15.3
1985	731,962	54,296[u]	879,174	1.7	194,086	47,161	298,153	7.4	18.2	1.57[u]	0.10	0.4	35–12⅛	15.9
1984	731,314	41,406[v]	452,273	2.2	159,115	17,900	214,906	5.7	19.3	1.31[v]	0.05	0.5	12⅞–7½	7.8
1983	699,397	(24,189)[w]	414,257	1.7	164,488	13,904	169,804	—	—	(1.11)[x][w]	0.025	0.3	9⅞–6½	—
W. R. Grace & Co.														
1986	$ 3,725,700	($375,400)[y][z]	$ 3,993,000	1.3	$ 1,579,000	$ 199,100	$ 1,294,400	—	—	($8.94)[y][z]	$2.80	5.3%	$60⅝–45½	—
1985	5,193,000	127,800[y]	5,287,900	1.9	2,596,000	348,000	2,271,400	2.5%	5.6%	2.45[y]	2.80	6.6	49½–35½	17.3
1984	6,727,900	195,600	5,193,900	1.8	2,704,200	380,100	2,063,300	2.9	9.5	4.02	2.80	6.7	46⅞–36½	10.4
1983	6,219,500	159,700[z]	4,948,800	1.8	2,715,400	353,100	2,004,300	2.6	7.6	3.29[z]	2.80	6.3	50⅝–39⅝	13.5

a Fiscal year ends Sept. 30. b Excludes extraordinary charge for early retirement of indebtedness of $2.0 million ($0.07 per share). c From continuing operations; excludes net loss from discontinued operations of $12.7 million ($0.39 per share) and provision for net loss on disposal of discontinued operations of $145.0 million ($4.53 per share). d From continuing operations; excludes net income and gain on sale of discontinued Vestal Laboratories operations of $30.0 million ($3.36 per share) and extraordinary gain on termination of pension plan of $611,000 ($0.09 per share). e Excludes net gain on disposition of discontinued Dearborn Group operations of $875,000 ($0.11 per share). f From continuing operations; excludes net income and charge for discontinued Kem operations of $7.9 million ($2.48 per share). g Excludes net loss on early extinguishment of debt of $9 million ($0.05 per share). h Includes pretax gain on sales of investments of $183 million but excludes tax benefit from realization of foreign tax loss carry-forwards of $36 million ($0.19 per share). i Includes pretax gain on sales of investments of $101 million but excludes extraordinary net gain on debt-for-equity exchange of $41 million ($0.21 per share). j From continuing operations; excludes net loss from discontinued coated products operations of $2.0 million ($0.33 per share). k From continuing operations; excludes net loss from discontinued operations of $1.4 million ($0.22 per share). l Includes net charges for plant shutdown and write-off costs of $20.0 million. m Includes net nonrecurring charges of $25.2 million. n Includes net nonrecurring charges of $9.4 million. o Excludes net loss on sale of Productol Chemical division of $2.3 million ($0.34 per share). p Fiscal year ends June 30. q Net loss. r Excludes net gain from disposal of FirstMiss subsidiary of $900,000 ($0.04 per share). s Excludes net gain from disposal of FirstMiss subsidiary of $120,000 ($0.01 per share). t Excludes extraordinary credits of $212.5 million ($5.86 per share). u Excludes extraordinary credits of $29.3 million ($0.68 per share). v Excludes extraordinary credits of $15.7 million ($0.54 per share). w Excludes extraordinary credits of $25.4 million ($0.88 per share). x From continuing operations; includes asset write-downs and reserves, before taxes, of $368.8 million but excludes net loss from discontinued operations of $96.9 million ($2.31 per share). y From continuing operations; excludes net income from discontinued retail operations of $19.1 million ($0.37 per share). z Includes net gains on disposal of businesses of $5.7 million.

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Great Lakes Chemical Corp.														
1986	$ 300,329	$ 26,817	$ 447,840	2.3	$ 209,425	$ 18,327	$ 172,538	8.9%	15.5%	$1.79	$0.52	1.4%	$44½–30⅞	21.1
1985	276,932	28,818	314,423	2.2	137,710	21,344	186,716	10.4	15.4	1.93	0.44	1.2	44½–31⅛	19.6
1984	278,235	35,568	276,469	2.2	130,784	28,770	164,805	12.8	21.6	2.38	0.36	1.1	38⅝–24	13.2
1983	225,950	23,842	217,916	2.1	121,411	23,393	132,286	10.6	18.0	1.63	0.30	1.1	30⅝–16⅝	17.3
Hercules														
1986	$2,615,110	$226,733[a]	$2,914,319	2.8	$1,152,141	$256,913	$1,703,151	8.7%	13.3%	$4.02	$1.72	3.5%	$60–37	12.1
1985	2,587,213	133,161[b]	2,658,822	2.5	1,000,212	234,240	1,474,201	5.1	9.0	2.40	1.60	4.5	40⅝–31⅛	15.0
1984	2,570,365	197,185	2,388,489	2.4	906,031	218,105	1,366,911	7.7	14.4	3.54	1.48	4.5	38–27⅛	9.2
1983	2,628,954	174,222	2,175,173	2.1	793,313	167,993	1,288,116	6.6	13.5	3.17	1.36	3.9	43⅛–27⅛	11.1
International Flavors & Fragrances														
1986	$ 620,679	$ 85,683	$ 672,616	4.6	$ 186,891	$ 26,771	$ 521,475	13.8%	16.4%	$2.29	$1.16	2.9%	$48⅞–34½	18.2
1985	501,046	69,698	559,855	4.2	158,298	22,134	425,986	13.9	16.3	1.89	1.12	3.4	40–26	17.5
1984	476,678	66,242	452,392	4.4	140,109	20,942	351,183	14.5	19.7	1.89	1.08	4.1	29¼–22⅞	13.8
1983	460,945	60,410	458,262	3.5	139,921	26,851	344,255	14.8	19.9	1.87	1.04	3.5	35⅝–23⅝	15.9
International Minerals & Chemical Corp.														
1986[c]	$1,177,700	($79,600)[d,e]	$2,225,200	2.2	$2,170,700	$ 93,900	$ 792,400	—	—	($2.96)[d,e]	$1.80	5.9%	$36¼–25	—
1985[c]	1,627,300	119,600	1,957,200	2.0	2,144,300	116,000	1,092,000	7.3%	11.0%	4.39	2.60	6.6	44–34½	8.9
1984[c]	1,532,900	112,000[f]	1,965,600	1.9	2,061,400	104,800	1,039,100	7.3	10.8	4.17[f]	2.60	6.4	49–32⅞	9.8
1983[c]	1,462,000	80,500	1,943,900	1.9	1,983,700	119,300	1,024,100	5.5	7.9	3.02	2.60	6.5	49–31⅝	13.3
Lawter International														
1986	$ 103,515	$ 12,945	$ 93,392	3.7	$ 22,447	$ 1,613	$ 55,191	12.5%	23.5%	$0.74	$0.56	3.9%	$17⅞–11½	19.5
1985	96,769	(5,413)[d,e]	84,039	3.4	22,702	3,179	47,588	—	—	(0.31)[d,e]	0.56	4.7	13½–10⅝	—
1984	98,484	14,862	77,877	4.8	21,146	3,339	58,370	15.1	25.5	0.86	0.55	4.4	14½–10½	14.5
1983	90,020	14,340	75,615	4.4	21,066	3,345	55,785	15.9	25.7	0.83	0.49	4.8	14⅛–7⅛	12.8
Liquid Air Corp.														
1986	$ 570,565	$ 34,680	$ 682,307	1.1	$ 475,321	$130,544	$ 303,554	6.1%	11.4%	$2.42	$1.60	5.1%	$36½–25⅝	12.9
1985	543,041	31,753	599,281	1.2	418,165	103,675	289,819	5.8	11.0	2.42	1.60	6.8	27⅝–19½	9.8
1984	561,735	27,304	548,821	1.8	370,530	62,461	246,867	5.4	11.1	2.07	1.60	7.7	23–18⅛	10.0
1983	459,409	23,902	500,573	1.5	354,796	41,620	244,849	5.2	9.8	1.80	1.60	7.2	26⅛–18½	12.4
Loctite Corp.														
1986[c]	$ 256,788	$ 23,173	$ 240,565	2.2	$ 57,711	$ 9,290	$ 150,163	8.7%	15.4%	$2.56	$0.82	2.0%	$49⅝–33½	16.2
1985[c]	231,479	20,443	215,482	1.9	49,793	11,278	121,918	8.8	16.8	2.24	0.80	2.5	37–27	14.3
1984[c]	241,744	25,349	223,894	2.0	45,696	6,172	129,526	10.9	20.3	2.67	0.64	1.7	42⅝–30⅝	13.7
1983[c]	215,892	17,128	209,387	2.2	46,789	9,955	120,419	7.9	13.2	1.72	0.56	1.5	46½–28½	21.8
Lubrizol Corp.														
1986	$ 976,776	$ 78,185	$ 877,907	2.7	$ 299,078	$ 40,480	$ 572,679	8.0%	13.7%	$1.97	$1.17	3.9%	$35½–25⅝	15.4
1985	903,403	60,224	854,445	2.4	290,298	39,498	519,298	6.7	11.6	1.49	1.16	4.8	28⅞–19⅝	16.3
1984	831,661	67,731	701,974	2.8	251,735	29,490	474,343	8.1	14.3	1.73	1.12	5.2	24½–18⅛	12.4
1983	789,546	64,744[h]	662,864	2.8	274,337	25,003	471,521	8.2	13.7	1.65[h]	1.08	4.7	27⅞–18⅛	13.9
Monsanto Co.														
1986	$8,879,000	$433,000	$8,125,000	1.4	$2,913,000	$520,000	$1,637,000	6.3%	26.5%	$5.55	$2.575	4.1%	$81½–44⅜	11.4
1985	6,747,000	(128,000)[d,i]	6,678,000	1.1	3,034,000	645,000	1,208,000	—	—	(1.67)[d,i]	2.45	5.1	55⅜–40⅝	—
1984	6,891,000	439,000	6,250,000	2.0	3,374,000	614,000	3,511,000	6.6	12.5	5.42	2.25	4.8	53⅞–40⅝	11.5
1983	6,299,000	360,000[j]	6,427,000	2.1	3,284,000	560,000	3,967,000	5.9	10.1	4.48[j]	2.075	4.4	58½–37⅛	10.6
Morton Thiokol														
1986[c]	$1,949,900	$132,900	$1,225,000	1.7	$ 583,900	$ 95,700	$ 629,900	6.8%	21.1%	$2.80	$0.685	1.9%	$42½–30	12.9
1985[c]	1,832,300	119,500[k]	1,173,900	1.8	560,700	117,000	510,500	6.5	23.4	2.44[k]	0.63	1.9	40½–28	13.8
1984[c]	2,001,500	109,750	1,152,082	1.5	526,713	90,859	489,945	5.5	22.4	2.17	0.57	2.2	31½–20	11.9
1983[c]	1,509,157	78,462	1,002,848	1.3	522,938	70,944	401,962	5.2	19.5	1.72	0.53	2.4	28⅞–18½	12.6
Nalco Chemical Co.														
1986	$ 736,074	$ 63,672	$ 536,916	1.7	$ 280,195	$ 63,636	$ 358,023	8.7%	17.8%	$1.62	$1.20	4.4%	$31⅛–23½	16.9
1985	682,333	73,332	492,998	1.8	247,912	59,905	335,685	10.7	21.8	1.87	1.20	4.8	28⅝–22	13.5
1984	664,303	73,088[l]	471,543	2.4	205,103	52,478	344,392	11.0	21.2	1.86[l]	1.20	4.4	33½–21	14.6
1983	650,403	71,000	487,616	2.3	191,791	40,505	348,386	10.9	20.4	1.78	1.14	3.5	37–28	18.3
National Distillers & Chemical Corp.														
1986	$1,729,600	$ 55,100[m]	$2,844,200	1.0	$1,393,800	$101,600	$ 944,500	3.2%	5.8%	$1.54[m]	$2.20	5.5%	$47⅝–33	25.2
1985	2,289,000	77,000[n]	1,948,000	1.5	899,300	76,200	930,300	3.4	8.3	2.27[n]	2.20	7.2	37½–23⅝	13.5
1984	2,244,900	69,900[o]	1,828,800	1.9	747,700	116,100	943,500	3.1	7.4	2.01[o]	2.20	8.3	30–22⅝	13.1
1983	2,588,900	66,700	1,907,300	2.3	780,900	71,300	1,032,300	2.6	6.5	1.77	2.20	8.0	31–23⅞	15.5

a Includes pretax gain on disposal of assets of $77.4 million. b Includes pretax gain on disposal of assets of $16.4 million. c Fiscal year ends June 30. d Net loss. e From continuing operations; excludes net loss from operations and net provision for loss on disposal of discontinued gas and oil and industrial products operations of $137.4 million ($5.08 per share). f Excludes net loss from operations and disposal of discontinued methanol joint venture of $30.3 million ($1.13 per share). g Includes one-time tax provision for future repatriation of foreign earnings of $14.0 million ($0.80 per share). h Includes net gain on sale of investments of $7.5 million ($0.19 per share). i Includes special charge for restructuring costs, before taxes, of $557 million but excludes net gain from repayment of debt of $30 million ($0.40 per share). j Excludes extraordinary net tax benefits from utilization of ex-U.S. loss carry-forwards of $33 million ($0.41 per share). k From continuing operations; excludes net income from discontinued Texsize division operations of $3.3 million ($0.06 per share) and net gain on sale of the division of $75.1 million ($1.51 per share). l Excludes net income from discontinued lead antiknock compounds operations of $3.1 million ($0.06 per share). m From continuing operations; excludes net income from discontinued spirits and wine operations of $20.5 million ($0.67 per share). n From continuing operations; excludes net income from discontinued insurance business of $200,000 ($0.01 per share). o From continuing operations; excludes net loss from discontinued metals and petroleum operations of $18.5 million ($0.60 per share).

2 Finances of the U.S. Chemical Industry

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Olin Corp.														
1986	$1,707,261	$ 75,226	$ 1,464,830	1.5	$ 719,686	$127,935	$ 574,290	4.4%	13.1%	$3.36	$1.525	3.5%	$53¼–34⅝	13.1
1985	1,751,106	(190,308)[a,b]	1,516,096	1.6	718,371	154,499	604,844	—	—	(8.28)[a,b]	1.50	4.5	38–28⅝	—
1984	2,065,328	88,747	1,822,099	1.2	860,658	165,000	867,307	4.3	10.2	3.81	1.365	4.7	33½–25⅛	7.7
1983	1,934,579	71,715	1,829,416	1.9	850,936	122,580	848,355	3.7	8.5	3.01	1.23	4.3	34–23	9.5
Pennwalt Corp.														
1986	$1,107,564	$ 51,947	$ 962,252	2.1	$ 436,282	$ 54,379	$ 465,369	4.7%	11.2%	$3.64	$2.20	4.4%	$ 59–40⅝	13.7
1985	1,013,308	11,218[c]	937,672	1.5	433,867	89,691	445,020	1.1	2.5	0.05[c]	2.20	5.6	44½–34	785.0
1984	1,047,214	45,356	868,673	1.9	393,765	87,177	405,325	4.3	9.3	3.31	2.20	6.0	42⅛–31½	11.1
1983	976,741	44,756[d]	851,982	2.6	348,190	69,808	458,077	4.6	9.8	3.59[d]	2.20	5.9	45⅝–29	10.4
Reichhold Chemicals														
1986	$ 765,588	$ 15,859[e]	$ 426,301	1.4	$ 202,988	$ 40,912	$ 163,942	2.1%	9.7%	$2.13[e]	$0.80	2.4%	$38¼–28⅝	15.6
1985	822,534	(28,432)[e,f]	451,903	1.2	203,972	35,057	134,714	—	—	(3.85)[e,f]	0.80	2.2	43⅛–29⅝	—
1984	801,355	25,709	371,819	2.0	172,219	24,228	206,421	3.2	12.5	3.63	0.65	2.2	35⅝–23	7.5
1983	747,253	21,700	382,273	2.0	175,722	19,305	211,081	2.9	10.3	2.74	0.51	1.8	38⅞–18¼	10.4
Rohm & Haas Co.														
1986	$2,067,000	$138,000[g]	$ 1,756,000	2.0	$ 648,000	$179,000	$ 916,000	6.7%	15.1%	$2.01[g]	$0.78	2.5%	$38⅝–23⅞	15.6
1985	2,051,000	141,000[h]	1,655,000	2.0	581,000	159,000	857,000	6.9	16.5	2.01[h]	0.70	3.1	26½–18⅝	11.1
1984	2,042,011	172,219[i]	1,540,570	2.0	555,945	134,253	872,687	8.4	19.7	2.24[i]	0.60	3.1	23⅛–16	8.7
1983	1,875,937	137,663	1,489,815	2.7	518,360	71,534	882,964	7.3	15.6	1.78	0.50	2.5	27–12⅝	11.1
Sigma-Aldrich Corp.														
1986	$ 253,097	$ 33,958	$ 244,875	2.5	$ 86,111	$ 35,461	$ 155,689	13.4%	21.8%	$1.38	$0.25	0.7%	$40⅛–26⅜	24.3
1985	214,848	28,855	186,552	3.4	57,771	17,386	126,306	13.4	22.9	1.13	0.21	0.9	28⅜–17⅛	20.1
1984	179,529	24,220	174,144	5.4	46,037	11,852	129,932	13.5	18.6	0.93	0.175	1.1	17⅛–14⅜	16.9
1983	150,592	19,715	140,506	5.8	39,050	7,882	109,842	13.1	17.9	0.76	0.15	1.0	17⅛–12⅞	19.7
Stepan Co.														
1986	$ 259,787	$ 7,513	$ 152,794	1.5	$ 85,607	$ 14,322	$ 55,029	2.9%	13.6%	$2.53	$0.74	2.6%	$35⅝–20⅜	11.3
1985	235,919	5,471	139,307	1.5	82,796	19,189	49,575	2.3	11.0	1.89	0.69	3.5	23¼–16⅜	10.5
1984	234,930	5,423[j]	133,941	1.6	73,261	11,557	47,660	2.3	11.4	1.66[j]	0.65	3.9	18⅝–14½	10.0
1983	207,074	6,337	144,997	1.5	76,044	9,804	58,459	3.1	10.8	1.75	0.58	3.9	17½–12	8.4
Union Carbide Corp.														
1986	$6,244,000	$130,000[k]	$ 7,496,000	1.2	$4,379,000	$524,000	$ 930,000	2.1%	14.0%	$1.25	$1.50	5.8%	$33⅛–18¾	20.8
1985[l]	6,596,000	(38,000)[k]	8,461,000	1.3	4,927,000	649,000	519,000	—	—	(0.38)[k]	1.13	6.1	24¾–12	—
1984	9,508,000	341,000[m]	10,402,000	1.8	6,383,000	670,000	4,808,000	3.6	7.1	1.61[m]	1.13	6.9	21⅝–10⅞	10.1
1983	9,001,000	218,000[n]	10,226,000	1.8	6,282,000	761,000	4,860,000	2.4	4.5	1.04[n]	1.13	5.4	24⅝–17	20.1
Vista Chemical Corp.														
1986[o]	$ 550,097	$ 30,212[p]	$ 453,418	1.8	$ 272,699	$ 15,792	$ 60,808	5.5%	49.7%	$1.73	$0.00	0.0%	$18⅝–17[q]	10.3
1985[o]	521,313	11,917	454,688	1.9	282,946	10,284	23,281	2.3	51.2	0.68	0.00	0.0	—	—
1984[o,r]	101,122	2,006	536,102	—	—	1,596	—	2.0	—	0.12	0.00	0.0	—	—
1983	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Witco Corp.														
1986	$1,355,018	$ 65,215	$ 804,086	2.4	$ 367,789	$ 60,102	$ 449,783	4.8%	14.5%	$2.93	$1.05	3.2%	$ 40–26⅜	11.3
1985	1,448,929	58,774	794,368	2.3	360,950	71,093	399,486	3.9	14.2	2.57	0.99	4.0	27⅜–22	9.7
1984	1,495,831	62,602	739,488	2.2	348,740	65,720	358,497	4.2	17.5	2.85	0.93	4.2	26⅜–18⅜	7.8
1983	1,305,744	52,022	715,472	2.1	313,794	44,901	319,334	3.8	16.3	2.40	0.84	4.6	24⅞–11⅝	7.8
PHARMACEUTICALS														
Abbott Laboratories														
1986	$3,807,534	$540,460	$ 3,865,609	1.3	$1,543,267	$383,400	$1,778,921	14.2%	30.4%	$2.32	$0.84	1.9%	$ 55–31⅝	19.7
1985	3,360,273	465,335	3,468,373	1.9	1,368,542	292,900	1,870,663	13.8	24.9	1.94	0.70	2.5	36–19⅞	14.4
1984	3,103,982	402,575	3,172,897	1.7	1,236,572	334,800	1,602,700	13.0	25.1	1.67	0.60	2.8	24⅜–18⅝	12.8
1983	2,927,873	347,617	2,824,128	1.7	1,069,200	311,600	1,417,883	11.9	24.5	1.43	0.50	2.2	26⅝–18	15.6
American Home Products Corp.														
1986	$4,926,512	$778,824	$ 3,819,146	2.7	$ 929,400	$204,764	$2,024,869	15.8%	38.5%	$5.18	$3.10	4.8%	$94⅞–61¼	15.1
1985	4,684,742	717,140	3,201,746	3.3	859,414	179,347	2,098,293	15.3	34.2	4.70	2.90	5.0	66⅞–50⅛	12.4
1984	4,485,470	655,829[s]	2,849,732	3.3	769,623	141,891	1,905,733	14.6	34.4	4.26[s]	2.64	5.2	55⅛–46⅜	12.0
1983	4,856,501	627,233	2,864,104	2.9	812,370	204,680	1,826,984	12.9	34.3	4.00	2.40	5.0	54⅛–41⅜	12.0

a Net loss. b From continuing operations; includes special charge for restructuring costs, before taxes, of $330.0 million but excludes net income and net gain on sale of Ecusta paper and film businesses of $25.0 million ($1.09 per share). c From continuing operations; includes special charge for restructuring program, before taxes, of $38.6 million but excludes net loss from operations and on disposal of discontinued dental businesses of $30.9 million ($2.80 per share). d Includes gain on sale, retirement, and revaluation of assets, before taxes, of $21.7 million. e Includes net gain on sale or liquidation of assets of $14.6 million. f Includes special charge for restructuring program, before taxes, of $39.6 million. g Includes net loss on disposal of assets of $9.2 million ($0.13 per share). h Includes net gain on disposal of assets of $4.6 million ($0.07 per share). i Includes net loss on sale of oil and gas properties of $3.6 million ($0.05 per share). j Includes nonrecurring net loss on write-down of equipment of $2.6 million. k From continuing operations; excludes net income and net gain on disposals of discontinued operations of $569 million ($5.49 per share) and net charges for extraordinary items of $203 million ($1.96 per share). l Pro forma, after adjustment for repurchase of common stock, sale of consumer products businesses, special charges for restructuring program, and other special gains and losses. m Excludes extraordinary charge related to accident in Bhopal, India, of $18 million ($0.06 per share). n Excludes nonrecurring net charge for closing of facilities of $139 million ($0.66 per share). o Fiscal year ends Sept. 30. p Excludes net loss on extinguishment of debt of $1.4 million ($0.06 per share). q From initial public offering Dec. 11. r From start of operations July 20. s From continuing operations; excludes net income from operations and net gain on sale of discontinued businesses of $76.3 million ($0.50 per share).

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Bristol-Myers Co.														
1986	$4,835,900	$589,500	$3,993,900	2.5	$1,070,000	$221,900	$2,646,500	12.2%	22.3%	$ 2.06	$1.06	2.9%	$ 44½–30⅛	18.0
1985	4,444,000	531,400	3,557,300	2.3	925,900	222,000	2,287,100	12.0	23.2	1.93	0.905	3.1	34¼–24½	15.2
1984	4,189,400	472,400	3,100,800	2.4	791,100	191,800	1,998,100	11.3	23.6	1.72	0.75	3.2	29⅛–20½	13.6
1983	3,917,000	408,000	2,888,300	2.2	701,700	165,000	1,788,900	10.4	22.8	1.50	0.58	2.9	24–15⅝	13.2
Eli Lilly & Co.														
1986	$3,720,400	$556,200	$4,117,000	1.7	$1,527,800	$283,000	$2,260,800	15.0%	24.7%	$ 4.01	$1.80	2.7%	$ 83½–56⅜	16.7
1985	3,270,600	517,500	3,859,400	1.7	1,374,000	207,100	2,293,400	15.8	22.6	3.68	1.60	3.6	55⅞–32⅛	11.9
1984	3,109,200	490,200	3,556,500	1.6	1,280,400	205,300	2,133,800	15.8	23.0	3.36	1.49	4.9	33⅝–26½	9.0
1983	3,033,700	457,400	3,401,200	1.7	1,212,600	199,900	2,108,400	15.1	21.6	3.06	1.375	4.4	34⅛–28⅛	10.2
Merck & Co.														
1986	$4,128,900	$675,700	$4,967,900	1.7	$1,906,200	$210,600	$2,431,800	16.4%	27.8%	$ 4.85	$1.90	1.9%	$129½–67⅛	20.3
1985	3,547,500	539,900	4,805,100	1.9	1,882,800	237,600	2,536,900	15.2	21.3	3.79	1.80	2.8	68⅞–45⅛	15.0
1984	3,559,665	492,967	4,489,697	1.9	1,912,778	274,425	2,443,260	13.8	20.2	3.35	1.50	3.4	48⅝–30⅛	13.1
1983	3,246,136	450,855	4,119,098	1.7	1,715,207	272,756	2,339,013	13.9	19.3	3.05	1.40	3.0	52⅞–40⅞	15.3
Pfizer														
1986	$4,478,000	$880,000	$4,946,700	1.9	$1,351,300	$196,100	$3,198,200	14.7%	20.6%	$ 3.90	$1.64	2.6%	$ 72⅞–46⅛	15.3
1985	4,024,500	579,700	4,341,500	2.1	1,268,300	195,800	2,805,900	14.4	20.7	3.44	1.48	3.2	56⅛–37⅝	13.6
1984	3,654,500	507,900	3,927,700	2.1	1,155,500	144,000	2,365,100	13.2	21.5	3.08	1.32	3.7	42⅝–29⅝	11.6
1983	3,750,000	447,100	3,830,000	2.0	1,157,000	214,900	2,074,700	11.9	21.6	2.73	1.16	3.0	44⅝–33⅝	14.4
A. H. Robins Co.														
1986	$ 789,895	$ 81,796	$ 752,230	3.5	$ 137,984	$ 13,598	($37,532)[a]	10.4%	—	$ 3.38	$0.00	0.0%	$ 15⅝–7½	3.4
1985	706,134	61,414[b]	620,710	3.7	149,954	23,150	(132,933)[a]	8.7	—	2.53[b]	0.00	0.0	24⅜–5½	5.9
1984	631,891	(461,613)[c]	565,627	1.5	135,685	38,155	(210,353)[a]	—	—	(18.44)[c]	0.72	4.1	23¼–12⅛	—
1983	563,519	58,221[d]	459,462	3.1	107,651	20,955	305,636	10.3	19.0%	2.40	0.62	2.7	29⅝–16	9.5
Schering-Plough Corp.														
1986	$2,398,700	$265,800	$2,862,000	1.3	$1,143,500	$124,800	$1,319,700	11.1%	20.1%	$ 2.17	$0.90	2.5%	$ 44–28	16.6
1985	1,927,100	192,600	2,683,800	1.4	991,800	140,300	1,389,600	10.0	13.9	1.88	0.84	3.3	33¼–17⅝	13.5
1984	1,874,300	177,200	2,436,200	1.2	912,400	173,700	1,235,100	9.5	14.3	1.75	0.84	4.6	20–16½	10.4
1983	1,808,500	178,500[e]	2,309,800	1.3	841,400	177,700	1,186,500	9.9	15.0	1.70[e]	0.84	4.0	24–16⅜	12.5
SmithKline Beckman Corp.														
1986	$3,745,400	$521,100	$3,891,400	1.3	$1,410,800	$237,000	$ 965,400	13.9%	54.0%	$ 3.39	$1.50	3.4%	$ 52⅝–36⅜	13.2
1985	3,256,600	514,400	3,534,500	1.8	1,285,300	248,000	2,070,100	15.8	24.8	3.28	1.425	4.3	39⅝–26⅛	10.1
1984	2,949,200	500,300[f]	3,077,600	2.0	1,093,000	241,500	1,952,100	17.0	25.6	3.10[f]	1.40	5.1	30½–25	8.9
1983	2,835,391	485,999[g]	3,085,409	1.8	988,857	232,914	1,970,793	17.1	24.7	2.92[g]	1.325	4.6	38½–27⅝	11.3
Squibb Corp.														
1986	$1,784,629	$263,639[h]	$2,408,831	1.8	$ 645,630	$ 95,077	$1,358,006	14.8%	19.4%	$ 2.45[h]	$0.97	1.9%	$ 62–38⅛	20.4
1985	2,041,745	226,599	2,396,592	2.0	701,439	120,342	1,409,382	11.1	16.1	2.10	0.86	2.6	41½–24⅞	15.7
1984	1,886,037	197,172	2,072,188	2.1	617,724	115,629	1,286,517	10.5	15.8	1.84	0.74	3.2	27⅛–18⅝	12.5
1983	1,768,891	173,274[i]	1,887,783	2.2	564,613	109,800	1,173,399	9.8	14.8	1.65[i]	0.68	2.8	27⅞–21½	14.9
Sterling Drug														
1986	$1,990,434	$171,507	$1,624,545	2.1	$ 397,156	$ 67,881	$ 874,312	8.6%	19.6%	$ 2.91	$1.29	2.9%	$ 52–36⅜	15.2
1985	1,753,724	153,310[j]	1,568,991	2.0	358,190	74,176	907,646	8.7	16.9	2.56[j]	1.19	3.5	41⅜–26⅝	13.3
1984	1,627,296	144,853[k]	1,429,618	2.5	370,273	73,158	894,943	7.9	16.2	2.39[k]	1.15	4.3	30–23½	11.2
1983	1,901,171	136,844	1,437,440	2.5	368,328	63,189	879,655	7.2	15.6	2.24	1.11	4.3	29⅝–22⅛	11.6
Upjohn Co.														
1986	$2,280,325	$252,648	$2,664,956	1.9	$ 981,549	$201,920	$1,470,216	11.1%	17.2%	$ 1.35	$0.51	1.8%	$ 35½–20½	20.7
1985	2,008,486	203,193[l]	2,376,873	1.8	852,054	152,637	1,295,085	10.1	15.7	1.10[l]	0.45	2.6	23⅜–11⅛	15.8
1984	2,179,060	173,272	2,248,363	1.5	908,534	136,738	1,134,154	8.0	15.3	0.94	0.43	4.4	12–7½	10.3
1983	1,999,106	166,225	2,195,048	1.9	754,954	155,016	1,057,288	8.1	15.2	0.88	0.39	4.1	11½–7⅞	10.9
Warner-Lambert Co.														
1986	$3,102,918	$291,784[m]	$2,479,054	1.4	$ 819,291	$137,996	$ 870,453	8.4%	30.1%	$ 3.54[m]	$1.50	2.9%	$ 63½–45	15.3
1985	3,200,000	237,704[n]	2,286,187	1.2	868,931	138,774	816,279	7.4	29.0	3.05[n]	1.50	3.2	49⅜–33⅜	13.6
1984	3,186,657	223,887	2,377,066	1.5	863,179	142,461	910,125	7.1	24.6	2.81	1.48	4.6	36½–29⅝	11.5
1983	3,108,325	208,496	2,368,879	1.7	826,232	165,554	869,990	6.5	23.0	2.51	1.42	4.7	35–25⅝	12.1

a Deficit. b Excludes extraordinary net gain from tax benefit associated with operating carry-forward of $14.4 million ($0.59 per share). c Net loss; includes income, before taxes, from litigation settlement of $1.2 million and net charge for reserve for Dalkon Shield claims of $469.1 million ($19.53 per share). d Includes net income, before taxes, from litigation settlement of $2.3 million. e From continuing operations; excludes net gain on sale of discontinued home products business of $11.6 million ($0.11 per share). f Excludes net gain on sale of Industrial Business Group of $3.3 million ($0.02 per share). g From continuing operations; excludes net income of discontinued Industrial Business Group of $3.5 million ($0.02 per share). h From continuing operations; excludes net income from discontinued operations of $13.1 million ($0.12 per share), net gain on disposal of discontinued operations of $187.6 million ($1.75 per share), and extraordinary net charge for write-off of certain foreign assets of $66.0 million ($0.63 per share). i Excludes extraordinary net gain on early extinguishment of debt of $27.0 million ($0.26 per share) and net loss on disposal of Latin American operations of $27.6 million ($0.27 per share). j From continuing operations; excludes net loss from divested Hilton-Davis chemical business of $43.6 million ($0.73 per share). k From continuing operations; excludes net loss on operations of divested environmental control business of $1.5 million ($0.02 per share). l From continuing operations; excludes net loss from operations and sale of polymer chemical business of $238,000. m Excludes net nonrecurring credit from write-down and divestiture of assets and restructuring program of $47.7 million ($0.64 per share). n Excludes net nonrecurring charge for write-down and divestiture of assets and restructuring program of $553.3 million ($7.10 per share).

3 Employment in the U.S. Chemical Industry

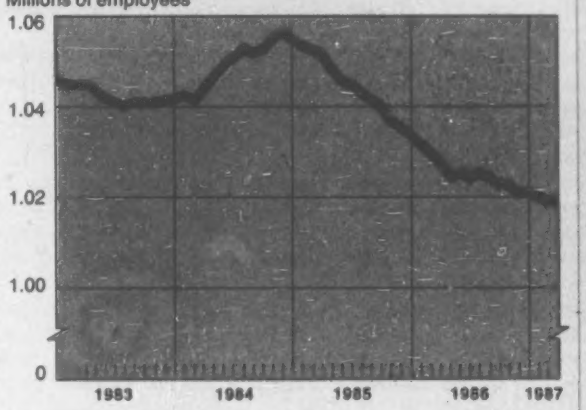
Chemical employment continues to dwindle

The number of workers employed by the U.S. chemical industry declined again in 1986 to about 1,027,000, the lowest level since 1975. The size of the chemical work force has been shrinking steadily since the end of 1984, and the downward pattern continues in the first half of 1987.

Only one chemical sector of the overall chemical industry—drugs—had more employees in 1986. Yet those additions returned the drug work force only to its 1984 levels. Producers of inorganic and organic chemicals and plastics made the deepest cuts in employee rolls.

Major chemical firms as a group reduced their ranks of employees by a whopping 24%. W. R. Grace and Union Carbide accounted for most of the decline, as both firms sold major operating units during the past year. However, such other large employers as Monsanto and Dow Chemical also trimmed employment significantly.

Employment in chemical industry dropped more than 3% in 1985 and 1986



a Seasonally adjusted employment in U.S. chemicals and allied products industry; March and April 1987 figures are preliminary. Source: Department of Labor

INDUSTRIAL EMPLOYMENT: Long-term decline continues in chemical industry

	All employees[a] (thousands)				Production workers[a] (thousands)				Workweek[a,b] (hours)			
	1986	1985	1984	1976	1986	1985	1984	1976	1986	1985	1984	1976
All manufacturing	19,186	19,314	19,378	18,997	13,023	13,130	13,285	13,638	40.7	40.5	40.7	40.1
Chemicals and allied products	1,027	1,046	1,049	1,042	572	579	583	600	42.0	41.9	41.9	41.6
Industrial inorganic chemicals	137	143	143	152	70	72	73	93	42.1	41.7	42.1	41.8
Plastic materials and synthetics	167	172	178	218	112	114	117	141	42.2	42.3	42.2	41.5
Drugs	206	205	206	171	96	95	96	85	41.6	41.1	40.7	40.9
Soap, cleaners, and toilet goods	147	148	145	128	93	94	93	77	41.0	41.0	41.3	40.9
Paints and allied products	63	64	62	65	31	31	30	35	41.6	41.4	41.7	41.2
Industrial organic chemicals	155	160	162	159	82	82	82	80	43.5	43.3	43.0	42.6
Agricultural chemicals	57	60	61	67	35	37	38	42	42.3	42.7	42.8	43.0
Miscellaneous chemical products	94	95	92	82	53	54	54	47	41.8	41.9	41.8	41.3
Petroleum and coal products	164	178	189	199	103	107	111	128	43.7	43.0	43.7	42.1
Rubber and miscellaneous plastics products	801	790	780	640	624	610	608	493	41.3	41.1	41.7	40.7

a Domestic employment. b Workweek of production or nonsupervisory workers. Source: Department of Labor

EMPLOYMENT OF SCIENTISTS, ENGINEERS: Large increase in pharmaceutical sector

Thousands[a]	1986[b]	1985[b]	1984	1983	1982	1981	1980	1979	1978	1977	1976
Total, all industry	580.2	563.9	544.5	522.1	509.8	487.8	450.6	423.9	404.4	382.8	364.4
Chemicals and allied products	71.3	67.0	67.1	66.0	61.6	54.7	51.4	50.0	48.3	46.4	44.4
Industrial chemicals	26.8	25.0	26.7	27.2	25.9	21.6	20.9	21.4	21.3	20.6	20.1
Drugs and medicines	33.3	30.7[c]	30.1[c]	28.2	25.6	23.3	21.6	20.6	19.5	17.8	16.6
Other chemicals	11.2	11.3	10.3	10.6	10.1	9.8	8.9	7.8	7.5	8.0	7.8
Petroleum refining	10.3	13.4	13.2	14.7	15.6	13.0	10.8	10.1	9.9	8.9	8.6
Rubber products	13.2	13.4	na	na	8.1	10.3	na	8.1	7.9	9.1	8.6

a Full-time equivalent number of R&D scientists and engineers in industry, as of January of each year. b Preliminary. c Partly estimated. na = not available separately, but included in total. Source: National Science Foundation

CHEMICAL EMPLOYMENT: Down dramatically last year following divestitures and restructuring

Thousands	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Air Products	16.6	18.7	17.7	16.7	18.9	16.2	15.8	14.6	14.3	13.7	13.4
American Cyanamid	34.5	36.4	38.2	38.7	40.2	41.8	42.6	44.2	44.0	43.8	39.4
Crompton & Knowles	1.3	2.3	2.3	2.4	2.3	2.5	2.8	3.0	3.2	3.1	3.0
Dow Chemical	51.3	53.2	49.8	54.5	56.6	63.8	56.8	55.9	53.5	53.2	53.0
Ethyl	10.5	10.5	11.0	13.0	14.0	14.5	15.0	16.0	16.5	16.0	16.0
H. B. Fuller	4.5	4.4	4.3	4.1	4.0	3.3	3.4	3.4	3.3	3.0	2.8
W. R. Grace	41.4	116.9	102.6	95.5	82.2	89.0	92.0	82.8	69.1	69.1	64.0
Hercules	25.1	25.4	26.3	24.2	24.5	25.9	26.1	27.4	27.1	26.3	25.7
International Flavors	3.8	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.5	3.3	3.1
International Minerals	13.9	8.7	9.0	8.4	8.4	10.6	10.6	10.3	9.9	9.9	9.7
Lubrizol	4.8	5.2	4.2	4.2	4.3	4.2	4.2	3.9	3.8	3.8	3.6
Monsanto	51.7	56.1	50.8	48.8	52.2	57.4	61.8	63.9	62.9	61.5	61.9
Nalco Chemical	4.9	5.1	4.8	4.6	4.6	4.7	4.3	4.1	4.1	4.2	3.8
Olin	13.2	14.9	17.8	18.2	17.5	20.3	21.0	21.7	22.7	22.4	22.0
Pennwalt	9.6	9.9	9.8	9.8	9.5	10.7	12.8	13.3	14.0	13.9	13.9
PPG Industries	36.5	37.5	37.7	37.0	37.0	36.6	37.3	38.2	37.4	36.6	36.3
Reichhold Chemicals	4.0	4.6	4.2	4.4	4.5	5.6	5.6	6.4	6.5	6.5	5.8
Rohm & Haas	12.1	11.8	11.9	11.4	11.5	13.5	13.2	13.3	13.1	13.0	13.3
Stepan	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.7
Union Carbide	50.3	91.5	98.4	99.5	103.2	110.3	116.1	115.8	113.4	113.7	113.1
TOTAL EMPLOYEES	**390.8**	**517.7**	**505.4**	**500.0**	**499.9**	**535.4**	**545.8**	**542.7**	**523.1**	**517.6**	**504.5**
ANNUAL CHANGE	**−24.5%**	**2.4%**	**1.1%**	**0.0%**	**−6.6%**	**−1.9%**	**0.6%**	**3.7%**	**1.1%**	**2.6%**	**2.2%**
SALES PER EMPLOYEE ($ thousands, current)	**$135.2**	**$113.4**	**$115.4**	**$109.8**	**$107.6**	**$109.3**	**$102.2**	**$ 93.6**	**$ 80.9**	**$ 74.0**	**$ 66.9**
SALES PER EMPLOYEE ($ thousands, constant 1972[a])	**$ 46.9**	**$ 39.0**	**$ 39.9**	**$ 39.1**	**$ 38.3**	**$ 39.6**	**$ 40.9**	**$ 43.9**	**$ 42.4**	**$ 40.0**	**$ 36.9**

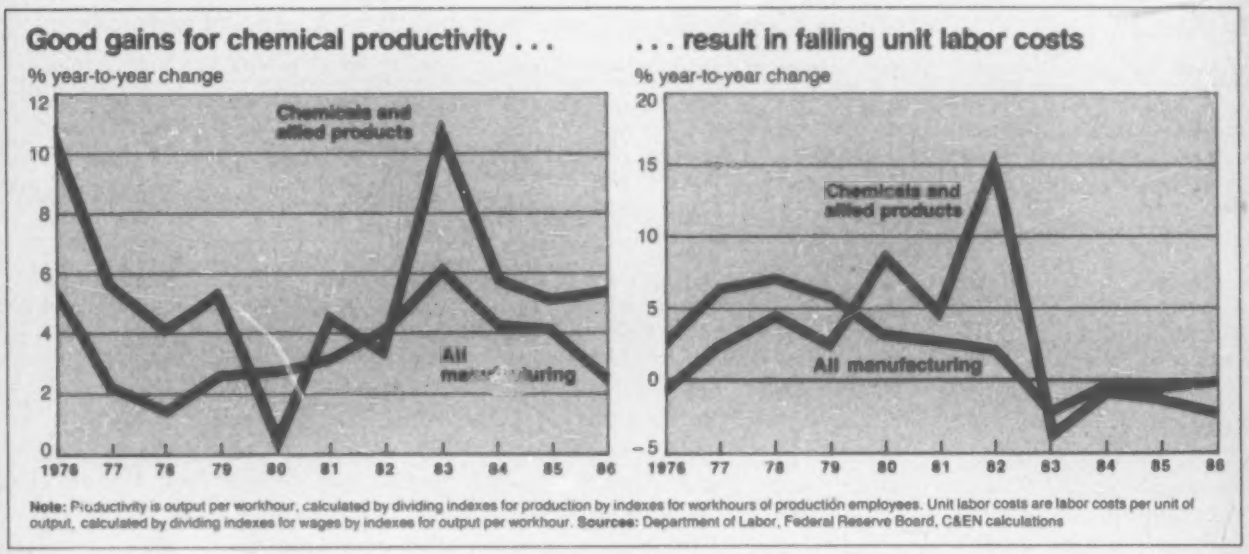
Note: Data are not restated for acquisitions, divestitures, and similar developments. a Based on producer price index for chemicals and allied products.

WAGES: Twice the level of a decade ago for chemical workers

	Hourly earnings[a]				Weekly earnings[a]			
	1986	1985	1984	1976	1986	1985	1984	1976
All manufacturing	$ 9.73	$ 9.53	$ 9.18	$5.22	$396.01	$385.97	$373.63	$209.32
Chemicals and allied products	11.97	11.56	11.08	5.91	502.74	484.36	464.25	245.86
Industrial inorganic chemicals	13.14	12.81	12.30	6.37	553.19	534.18	517.83	266.27
Plastic materials and synthetics	12.10	11.71	11.10	5.79	510.62	495.33	468.42	240.29
Drugs	11.12	10.74	10.23	5.59	462.59	441.41	416.36	228.63
Soap, cleaners, and toilet goods	10.73	10.27	9.89	5.59	439.93	421.07	408.46	228.63
Paints and allied products	10.42	10.08	9.75	5.43	433.47	417.31	406.58	223.72
Industrial organic chemicals	14.36	13.98	13.43	6.88	624.66	605.33	577.49	293.09
Agricultural chemicals	11.42	11.02	10.73	5.44	483.07	470.55	459.24	233.92
Miscellaneous chemical products	11.15	10.61	10.08	5.54	466.07	444.58	421.34	228.80
Petroleum and coal products	14.19	14.06	13.43	7.21	620.10	604.58	586.89	303.54
Rubber and miscellaneous plastic products	8.76	8.54	8.29	4.66	361.79	350.99	345.69	189.66

a For production and nonsupervisory workers in domestic employment. Source: Department of Labor

3 Employment in the U.S. Chemical Industry


Good gains for chemical productivity . . .
% year-to-year change
Chemicals and allied products
All manufacturing
. . . result in falling unit labor costs
% year-to-year change
Chemicals and allied products
All manufacturing

Note: Productivity is output per workhour, calculated by dividing indexes for production by indexes for workhours of production employees. Unit labor costs are labor costs per unit of output, calculated by dividing indexes for wages by indexes for output per workhour. Sources: Department of Labor, Federal Reserve Board, C&EN calculations

In an era of much talk about improving productivity and competitiveness, U.S. chemical companies seem to be doing well. They have cut the number of manhours needed to produce a unit of product and also are holding in check the labor costs associated with production.

Productivity in the U.S. chemical industry in 1986 rose for the fourth year as production increased and workhours dropped. The increase was almost twice that for manufacturing as a whole. Much of the change in 1986 stemmed from increasing production. Output of U.S. chemical plants increased nearly 5% over the previous year. But a drop of about 1% in workhours also helped, so that productivity in the chemical industry increased more than 5% over 1985.

By contrast, productivity for all manufacturing industries rose just 2.5% as production increased 2% and workhours declined only slightly.

Chemical companies also were able to keep wages pretty well in line, so that unit labor costs also were lower for the fourth straight year. Labor Department figures show average hourly wages in the chemicals and allied products industry in 1986 rose just 3.3% over the previous year. However, the hourly wage for all manufacturing was just 2.2% above the previous year.

As a result of its greater rise in productivity, the chemical industry likewise outperformed all manufacturing in lowering unit labor costs, which fell 2% for chemicals in 1986 but were essentially unchanged for all manufacturing.

PRODUCTIVITY: A continued drop for workhours in the chemical industry brings improvement

Indexes, 1977 = 100	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
CHEMICALS AND ALLIED PRODUCTS											
Production	132.9	127.1	121.6	113.9	103.8	112.6	106.4	113.3	106.3	100.0	92.0
Workhours	93.5	94.3	95.0	93.9	95.2	101.7	101.0	103.1	102.2	100.0	97.3
Productivity	142.1	134.8	128.0	121.3	109.0	110.7	105.4	109.9	104.0	100.0	94.6
Hourly production wages	186.1	180.1	172.7	164.8	155.0	141.8	129.2	118.2	109.2	100.0	91.9
Unit labor costs	130.9	133.7	135.0	135.9	142.2	128.2	122.6	107.6	105.0	100.0	97.2
ALL MANUFACTURING											
Production	129.2	126.4	123.4	113.9	102.2	110.5	108.2	110.7	106.1	100.0	94.1
Workhours	93.0	93.3	94.8	88.2	87.0	97.9	98.9	106.2	104.5	100.0	96.1
Productivity	138.9	135.5	130.1	124.8	117.5	112.9	109.4	104.2	101.5	100.0	97.9
Hourly production wages	171.1	166.9	161.5	155.4	149.6	140.7	128.1	118.0	108.6	100.0	91.9
Unit labor costs	123.2	123.2	124.1	124.4	127.3	124.7	121.5	113.2	107.0	100.0	93.8

Sources: Department of Labor, Federal Reserve Board

Exchange rates blur chemical trade figures

The much weaker dollar of the past year or so has given the U.S. chemical industry new strength in the world marketplace. After tailing off 2% in 1985, U.S. chemical exports rose almost 5% to $22.8 billion last year. Meanwhile, growth of U.S. chemical imports advanced only 3% to $15 billion.

As a result, the U.S. chemical industry, one of the very few U.S. industries that enjoy a favorable balance of trade, increased its trade surplus from $7.2 billion to $7.8 billion. That may not sound like an astounding achievement. But it comes on the heels of five successive years of decline from a lofty surplus of $12.1 billion in 1980, as chemical export growth all but disappeared and chemical imports soared.

World chemical trade statistics don't give the U.S. chemical industry its due. That's because the U.S. dollar has fallen so drastically against most of the world's major currencies over the past two years. For instance, preliminary statistics, in dollars, indicate that total world chemical trade increased a whopping 20% last year to an estimated $184 billion. Given the weak economies in virtually all of the world's industrialized nations, that large an increase is impossible.

Behind this statistical aberration lie the drastic changes in currency exchange rates. For instance, the European Economic Community, by far the largest chemical exporter in the world, boosted its chemical exports 22%, measured in dollars. However, measured in European Currency Units, chemical exports from the 12 community countries actually were 6% lower last year than they were in 1985.

On a volume basis, world chemical exports probably grew no more than 5 to 6% last year. And U.S. chemical exporters no doubt increased their share of world chemical markets rather than lost market share, as the dollar figures indicate.

U.S. TOTAL TRADE BALANCE: The deficit keeps increasing

$ Billions	1986	1985	1984	1976
Total exports	$217.3	$213.1	$217.9	$114.8
Total imports	370.0	345.3	325.7	120.7
Trade balance	−152.7	−132.2	−107.8	5.9

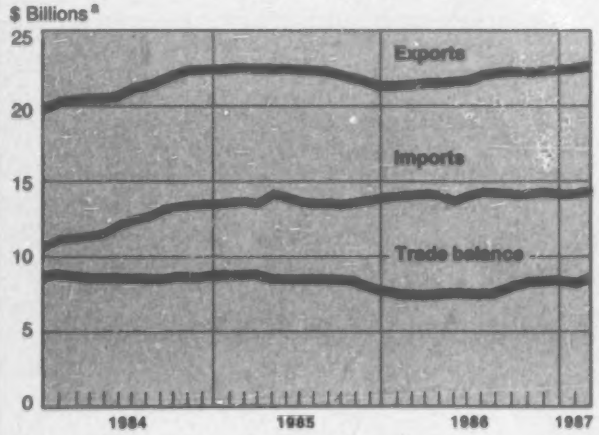
Source: Department of Commerce

U.S. CHEMICAL TRADE BALANCE: The surplus widens a little

$ Millions	1986	1985	1984	1976
Chemical exports	$22,766	$21,759	$22,336	$9958
Chemical imports	15,001	14,533	13,697	4772
Chemical trade balance	7,765	7,226	8,639	5186

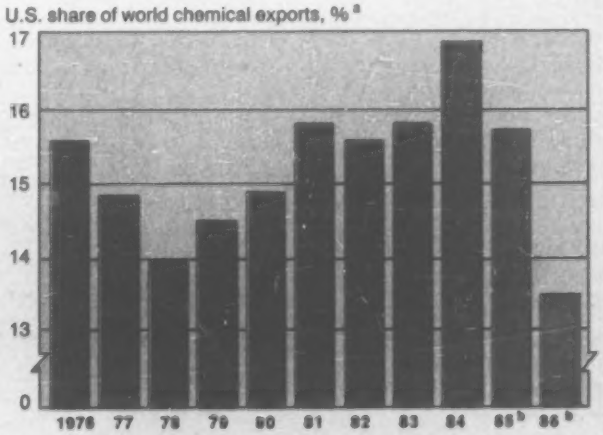
Source: Department of Commerce

U.S. chemical trade balance is expanding . . .



a Running 12-month totals. Source: Department of Commerce

. . . but U.S. share of world markets declines



a U.S. chemical exports as a percentage of total world chemical exports less U.S. chemical imports. b C&EN estimate. Source: Department of Commerce

WORLD TRADE: Weak dollar inflates data

$ Millions	1986	1985	1984	1976
CHEMICAL EXPORTS				
World	$184,000[a]	$153,000[a]	$146,421	$68,760
U.S.	22,766	21,759	22,336	9,958
Canada	4,189	4,040	4,187	1,443
EEC, 12 countries	98,067	80,113	73,307	38,643
Belgium-Luxembourg	8,601	6,882	6,449	4,026
France	14,770	13,715	12,574	6,089
Italy	7,788	6,608	6,203	2,877
Netherlands	13,790	11,324	11,005	6,000
U.K.	14,390	12,174	11,014	5,468
West Germany	31,370	24,253	23,369	12,532
Switzerland	8,124	5,879	5,503	3,213
Japan	9,484	7,697	7,447	3,747
CHEMICAL IMPORTS				
U.S.	$ 15,001	$14,533	$13,697	$4,772
Canada	4,677	4,454	4,544	2,057
EEC, 12 countries	78,087	61,109	56,745	29,254
Belgium-Luxembourg	7,312	5,855	5,437	3,009
France	13,717	10,854	9,973	5,211
Italy	11,039	8,518	7,813	3,539
Netherlands	8,015	6,825	5,804	3,309
U.K.	10,949	7,425	8,470	3,588
West Germany	17,706	13,858	13,084	6,459
Switzerland	4,796	3,664	3,397	1,720
Japan	9,733	8,072	8,112	2,662

a C&EN estimate. **Sources:** United Nations, Organization for Economic Cooperation & Development, European Economic Community, individual country data

U.S. TRADE: Higher with Europe and Asia

$ Millions	1986	1985	1984	1976
U.S. CHEMICAL EXPORTS				
Canada	$ 2,668	$ 2,698	$ 2,752	$1433
Western Europe	7,032	6,742	6,497	3528
Eastern Europe	365	368	275	78
Communist Asia	441	513	645	11
Japan	3,081	2,908	2,961	852
Rest of Asia	3,377	3,024	3,292	852
Middle East	345	400	429	229
Latin America	4,025	3,681	3,827	2165
Australasia	689	704	842	362
Africa	447	456	510	275
Other	276	265	306	173
TOTAL	$22,766	$21,759	$22,336	$9958
U.S. CHEMICAL IMPORTS				
Canada	$ 2,752	$ 2,913	$ 3,131	$1287
Western Europe	7,357	7,118	6,392	2206
Eastern Europe	327	380	325	38
Communist Asia	179	163	157	18
Japan	1,792	1,412	1,312	398
Rest of Asia	623	457	377	64
Middle East	238	218	124	43
Latin America	942	1,216	1,208	183
Australasia	221	231	251	343
Africa	326	203	196	28
Other	244	222	224	164
TOTAL	$15,001	$14,533	$13,697	$4772

Source: Department of Commerce

U.S. TRADE, BY PRODUCTS: Gains by plastics, drugs, and organics help swell chemical exports

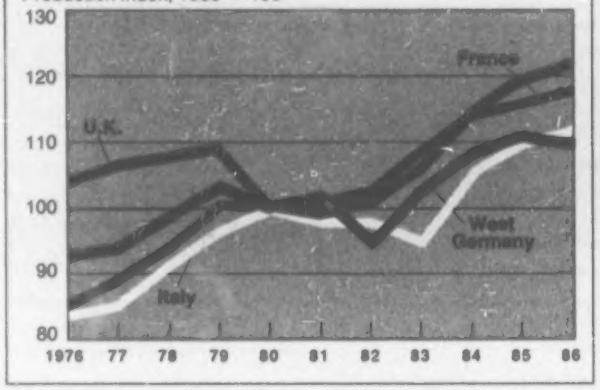
$ Millions	Chemical exports				Chemical imports			
	1986	1985	1984	1976	1986	1985	1984	1976
Organic chemicals	$ 6,293	$ 6,012	$ 6,093	$3003	$ 4,704	$ 4,576	$ 4,265	$1205
Inorganic chemicals	1,771	1,967	2,184	1010	1,894	1,984	2,064	938
Radioactive materials	1,302	1,311	1,421	471	1,382	1,417	1,394	659
Dyeing, tanning, and coloring materials	174	139	158	121	487	352	358	121
Pigments, paints, and varnishes	333	322	335	188	348	266	232	38
Medicinals and pharmaceuticals	3,090	2,708	2,628	996	1,240	1,084	931	269
Flavors, perfumes, cosmetics, toiletries	488	478	498	250	679	577	521	150
Cleaning and polishing materials	302	292	308	204	214	172	118	44
Fertilizer, manufactured	1,935	2,160	1,815	612	865	967	1,142	683
Explosives and pyrotechnics	81	100	146	63	111	103	84	28
Plastics and resins	4,301	3,777	4,050	1672	1,837	1,631	1,484	309
Pesticides and disinfectants	664	614	707	a	580	399	308	a
Miscellaneous	2,032	1,878	1,992	1369	660	1,005	797	329
TOTAL	$22,766	$21,759	$22,336	$9958	$15,001	$14,533	$13,697	$4772

a Included in miscellaneous chemical products. **Source:** Department of Commerce

In 1986, for the fourth consecutive year, Bayer topped all other West European chemical companies in sales volume. And as was the case last year, the other two major West German chemical concerns, BASF and Hoechst, ranked second and third, with ICI of the U.K. coming in fourth. On the basis of profit margin, the U.K.'s Laporte, which earned 9.8% on sales, and Fisons (9.5%) remained at the top of the 14 companies surveyed by C&EN. But Italy's Montedison turned in the best improvement, doubling its margin to 3.6%.

The U.S. dollar fell more than 20% below average 1985 levels against the currencies of Belgium, France, Italy, the Netherlands, Switzerland, and West Germany. This fluctuation should be kept in mind when comparing company results for 1986, translated into dollars, with similar figures for previous years.

Growth slows for chemical output



CHEMICAL INDUSTRY TRENDS: Output changes little, prices ease, employment steady

$ Billions (U.S.)	1986	1985	1984	1983	1982
WEST GERMANY					
Sales	$ 64.5	$ 50.5	$ 49.5	$ 49.7	$ 48.5
Exports	33.2	26.1	25.1	24.0	22.9
Imports	18.8	15.0	14.0	13.6	13.0
Capital spending	3.5	2.4	2.2	2.7	2.8
Production index[a]	110.1	111.1	108.8	103.4	96.4
Price index[a]	114.6	121.6	118.1	113.9	113.7
Employees (thousands)	567	557	550	549	559
FRANCE[b]					
Sales	$ 40.7	$ 31.8	$ 30.9	$ 30.1	$ 30.4
Exports	15.7	12.8	12.2	11.5	11.2
Imports	12.5	10.0	9.2	8.9	9.1
Capital spending	1.9	1.3	1.1	1.0	1.1
Production index[a]	117.5	116.3	114.3	108.7	102.8
Price index[a]	156.0	160.0	153.1	139.9	128.2
Employees (thousands)	268	272	279	282	286
ITALY					
Sales	$ 30.7	$ 24.5	$ 23.6	$ 22.9	$ 22.7
Exports	7.8	6.6	6.2	5.7	5.0
Imports	12.0	9.3	8.6	7.9	7.4
Capital spending	1.3	0.9	0.9	1.1	1.1
Production index[a]	111.8	110.3	106.2	100.0	98.3
Price index[a]	155.4	159.7	148.2	134.9	124.1
Employees (thousands)	230	233	241	251	260
U.K.[b]					
Sales	$ 30.6	$ 26.3	$ 25.2	$ 25.6	$ 28.2
Exports	14.3	12.1	11.0	10.5	11.5
Imports	11.0	9.0	8.8	8.1	8.2
Capital spending	1.9	1.6	1.4	1.4	1.9
Production index[a]	121.7	120.4	114.9	108.7	100 8
Price index[a]	133.4	131.6	125.1	119.1	113.5
Employees (thousands)	336	336	329	330	338
SPAIN[b,c]					
Sales	$ 20.7	$ 16.1	$ 15.2	$ 14.2	$ 15.2
Exports	3.1	2.9	2.7	2.2	2.2
Imports	4.7	3.1	3.0	2.8	2.9
Capital spending	0.4	0.3	0.2	0.3	0.4
Production index[a]	119.6	113.9	111.0	104.5	100.0
Price index[a]	177.7	175.9	163.6	147.4	131.0
Employees (thousands)	239	240	241	242	243

$ Billions (U.S.)	1986	1985	1984	1983	1982
BELGIUM[b,c,d]					
Sales	$ 17.2	$ 14.1	$ 13.6	$ 13.2	$ 14.1
Exports[d]	12.2	9.6	9.1	8.8	8.9
Imports[d]	8.6	6.9	6.6	6.3	6.3
Capital spending	0.7	0.4	0.4	0.4	0.3
Production index[a]	120.2	117.1	113.3	107.3	103.1
Price index[a]	141.6	145.0	139.9	133.7	126.0
Employees (thousands)	91	90	89	88	88
NETHERLANDS					
Sales	$ 16.0	$ 13.9	$ 13.6	$ 13.1	$ 12.5
Exports	15.7	12.9	12.5	12.0	11.3
Imports	9.5	8.0	7.2	6.8	6.7
Capital spending	1.2	0.8	0.8	0.7	0.6
Production index[a]	133.0	133.0	122.0	111.0	100.0
Price index[a]	105.0	123.0	116.0	115.0	114.0
Employees (thousands)	91	89	89	88	90
SWITZERLAND[b]					
Sales	$ 9.3	$ 6.7	$ 6.5	$ 6.7	$ 6.6
Exports	7.9	5.7	5.4	5.5	5.4
Imports	4.7	3.6	3.4	3.3	3.3
Production index[a]	125.5	122.9	115.7	109.6	103.0
Price index[a]	110.7	113.8	109.1	106.4	106.8
Employees (thousands)	68	66	65	68	na
SWEDEN					
Sales	$ 5.0	$ 4.1	$ 4.1	$ 3.9	$ 4.0
Exports	2.5	1.9	1.8	1.8	1.6
Imports	3.2	2.7	2.5	2.7	2.6
Capital spending	0.4	0.3	0.3	0.3	0.3
Production index[a]	113.2	114.0	114.6	113.2	104.8
Price index[a]	158.0	155.5	147.0	135.5	120.4
Employees (thousands)	42	43	44	43	44
NORWAY					
Sales	$ 2.3	$ 2.0	$ 2.1	$ 2.1	$ 2.0
Exports	1.3	1.2	1.2	1.1	1.0
Imports	1.4	1.1	1.0	0.9	0.9
Capital spending	0.2	0.1	0.1	0.1	0.1
Production index[a]	126.0	126.0	121.0	110.0	100.6
Price index[a]	129.0	127.0	128.1	123.6	117.9
Employees (thousands)	15	15	16	17	18

a 1980 = 100. b Excludes fibers. c Includes rubber and plastics processing. d Includes Luxembourg for exports and imports. ns = not available. **Sources:** National agencies and European Council of Chemical Manufacturers' Federations (CEFIC)

MAN-MADE FIBERS: Little change in production last year

Millions of lb	1986		1985		1984		1983		1982		Change, 1985–86	
	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics	Cellulosics
West Germany	1738	354	1764	372	1674	359	1654	334	1511	315	−1%	−5%
Italy	1430	66	1409	67	1329	68	1166[b]	65	1091[b]	102	1	−1
Spain	601	79	633	80	599	73	539	70	507	95	−5	−1
U.K.	524[c]	207[d]	557[c]	247[d]	561[c]	372[d]	541[c]	330[d]	506[c]	263[d]	−6	−16
France	392	44	427	44	456	61	437	83	435	100	−8	0
Benelux countries	378	108	365	95	318	94	189	90	198	124	4	14
Switzerland	216	0	226	0	218	0	204	0	183	0	−4	0
Ireland	161	0	140	0	136	0	118	0	114	0	15	0
Portugal	136	2	134	1	119	1	95	1	99	3	1	100
Austria	62	271	63	265	59	267	53	251	51	251	−2	2

a Includes polypropylene. b Excludes polypropylene. c Includes cellulose acetate filament. d Excludes cellulose acetate filament. Source: Comité International de la Rayonne et des Fibres Synthétiques

PRODUCTION: Declines last year just about balance increases

Millions of lb	1986	1985	1984	1983	Change 1985–86
FRANCE					
Sulfuric acid	8826	9433	9898	9024	−6%
Hydrochloric acid	1381	1446	1686	1483	−4
Chlorine	3151	3060	3103	2872	3
Sodium hydroxide	3304	3196	3274	3064	3
Ammonia	4455	4422	5170	4312	1
Benzene	1332	1399	1343	1373	−5
Toluene	83	89	87	90	−7
Xylenes	250	277	188	199	−10
Ethylene	4980	4749	4581	4563	5
Propylene	2283	2730	2652	2455	−16
Butadiene	641	634	667	620	1
Formaldehyde	176	203	210	208	−13
Polyethylene	2471	2266	2045	2070	9
Polypropylene	1034	933	871	842	11
Polystyrene	1089	1074	1060	1056	1
Polyvinyl chloride	1960	1804	1737	1796	9
Synthetic rubber	1193	1199	1218	1125	0
Phosphate fertilizers (P_2O_5)	1267	1340	1495	1577	−5
ITALY					
Sulfuric acid	9170	9588	9370	9071	−4%
Nitric acid	2402	2599	2420	2261	−8
Phosphoric acid	830	886	996	999	−6
Chlorine	2106	2031	2095	1974	4
Sodium hydroxide	2294	2268	2359	2219	1
Sodium perborate	212	218	229	241	−7
Sodium silicate	213	176	211	194	21
Ammonia	4155	3250	3233	2494	28
Benzene	1107	1075	1179	1160	3
Toluene	854	766	688	658	11
Xylenes	893	952	871	804	−6
Formaldehyde	297	301	325	312	−1
Acetic acid	116	129	140	237	−10
Carbon black	418	403	380	339	4
Polyethylene	1504	1408	1602	1564	7
Polystyrene	785	707	695	725	11
Polyvinyl chloride	1408	1358	1493	1391	4
Nitrogen fertilizers (N)	6948	7217	7134	6003	−4

a Manufacturers' sales. b From petroleum refining only. Sources: Government agencies for each country

Millions of lb	1986	1985	1984	1983	Change 1985–86
U.K.					
Sulfuric acid	5125	5621	5829	5892	−9%
Hydrochloric acid[a]	346	337	345	286	4
Phosphoric acid	649	826	896	981	−21
Chlorine	2234	2269	2156	1980	−2
Benzene	1893	1863	1660	1597	2
Ethylene	3244	3182	2913	2540	2
Propylene	1885	2141	2147	1719	−12
Butadiene	420	655	570	523	−36
Acetone	271	323	355	268	−16
Formaldehyde	225	272	228	226	−17
Polyethylene	955	1144	893	896	−17
Polypropylene	651	592	568	506	10
Polyvinyl chloride	651	391	379	420	10
Synthetic rubber	636	593	636	571	7
WEST GERMANY					
Sulfuric acid	7344	7571	8002	8009	−3%
Hydrochloric acid	2048	2079	2104	1980	−1
Nitric acid	6210	6361	6284	5778	−2
Chlorine	7538	7686	7536	6900	−2
Sodium hydroxide	7485	7581	7408	6830	−1
Sodium carbonate	3173	3096	3000	2679	2
Sodium sulfate	359	306	281	275	17
Carbon black	844	852	841	797	−1
Ammonia	4146	5036	5183	4495	−18
Benzene[b]	2892	2723	2734	2939	6
Toluene	1052	860	816	691	22
Xylenes	1190	1089	1003	1127	9
Aniline	408	369	373	331	11
Ethylene	5868	6661	7093	6980	−21
Propylene	3093	3665	3969	3793	−16
Butadiene	1505	1851	1661	1580	−19
Ethylene oxide	1093	1073	1044	993	2
Ethylene glycol	500	504	509	450	−1
Propylene oxide	1174	1179	1083	1110	0
Propylene glycol	395	371	372	351	0
n-Butanol	689	604	589	562	14
Acetaldehyde	686	726	737	647	−6
Acetic acid	653	655	668	590	0
Ethanol	217	170	120	171	28
Formaldehyde	1265	1253	1283	1175	1
Methanol	1016	1302	1504	1470	−22
Phthalic anhydride	433	378	453	429	15
Polyethylene	2785	2725	2882	2996	2
Polyvinyl chloride	2732	2658	2490	2398	3
Synthetic rubber	1026	1007	988	951	2
Nitrogen fertilizers (N)	1684	1826	1843	1642	−8
Phosphate fertilizers (P_2O_5)	311	394	473	552	−21

COMPANY RESULTS: Profit margins generally are a bit stronger while employment edges higher

$ Millions	Net sales	Net income	Profit margin	Capital spending	R&D spending	Employees (thousands)
Bayer (West Germany)						
1986	$18,778.3	$687.1	3.7%	$1093.5	$955.8	173.0
1985	16,621.1	488.4	3.1	700.0	725.9	176.1
1984	15,098.9	411.9	2.7	646.3	686.3	174.8
1983	14,641.6	295.7	2.0	734.1	664.3	174.8
BASF (West Germany)						
1986	$18,650.2	$419.4	2.2%	$1224.4	$676.5	131.5
1985	15,094.2	339.5	2.2	950.3	488.1	130.2
1984	14,175.4	314.0	2.2	719.6	435.8	115.8
1983	13,769.0	202.7	1.5	639.2	466.3	114.1
Hoechst (West Germany)						
1986	$17,518.0	$644.7	3.7%	$1234.6	$985.3	181.2
1985	14,531.3	499.3	3.4	804.4	708.5	180.6
1984	14,546.3	474.4	3.3	724.9	637.9	177.9
1983	14,583.9	356.5	2.4	733.3	634.1	179.6
Imperial Chemical Industries (U.K.)						
1986	$14,862.2	$879.8[a]	5.9%	$942.8	$573.3	121.8
1985	13,692.5	715.0[b]	5.1	821.2	452.1	118.6
1984	13,247.3	808.8[c]	6.1	589.6	399.7	115.6
1983	12,528.1	602.4[d]	4.8	547.8	418.8	117.9
Ciba-Geigy (Switzerland)						
1986	$8,863.9	$645.0	7.3%	$684.4	$903.9	82.2
1985	7,406.9	598.4	8.1	493.1	680.5	81.0
1984	7,435.7	505.1	6.8	428.5	619.6	81.4
1983	7,019.5	369.5	5.3	395.2	594.3	79.2
Montedison (Italy)						
1986	$8,607.6	$311.2[e]	3.6%	$570.8	$207.9	66.6
1985	7,402.8	126.3[e]	1.7	342.6	157.2	69.7
1984	7,047.2	(14.8)[f,g]	—	279.5	142.3	71.2
1983	7,017.8	(207.4)[f,h]	—	295.6	171.2	72.8
Rhône-Poulenc (France)						
1986	$7,603.8	$289.8	3.8%	$732.5	$426.3	78.0
1985	6,240.5	257.1	4.1	460.5	317.6	78.0
1984	5,958.4	227.6	3.9	395.2	281.7	80.0
1983	5,658.4	12.9	0.2	365.4	286.0	80.8
Norsk Hydro (Norway)						
1986	$7,341.0	($50.6)[i]	—	$1562.7	$81.2	43.1
1985	5,512.8	257.1	4.7%	825.0	58.1	26.4
1984	5,067.8	247.2	4.9	651.0	29.5	19.8
1983	4,719.5	147.7	3.1	593.0	29.0	18.8
DSM (Netherlands)						
1986	$7,229.4	$198.0[j]	2.7%	$534.7	$91.8	27.3
1985	7,128.6	142.8[j]	2.0	294.3	57.2	26.1
1984	7,016.8	179.6[k]	2.6	285.7	54.5	27.2
1983	6,929.3	80.2[l]	1.2	230.9	61.4	27.9

$ Millions	Net sales	Net income	Profit margin	Capital spending	R&D spending	Employees (thousands)
Akzo (Netherlands)						
1986	$6,373.5	$366.5[m]	5.7%	$451.4	$304.5	68.4
1985	5,424.7	275.1[n]	5.1	303.6	218.4	65.0
1984	5,146.4	252.0[o]	4.9	244.2	196.8	66.1
1983	5,292.8	189.2[p]	3.6	219.3	217.5	66.3
Solvay (Belgium)						
1986	$4,842.5	$222.3[q]	4.6%	$517.1	$192.6	44.8
1985	3,796.6	187.8[r]	4.9	271.1	131.8	44.5
1984	3,871.5	200.2[s]	5.2	195.6	126.7	43.5
1983	3,887.0	128.8[t]	3.3	162.3	127.1	44.2
Sandoz (Switzerland)						
1986	$4,645.0	$300.6	6.5%	$306.1	$414.4	42.6
1985	3,436.2	215.0	6.3	189.9	294.7	40.2
1984	3,163.4	174.9	5.5	129.4	269.8	38.0
1983	3,117.1	152.4	4.9	128.6	261.9	38.1
Hoffmann-La Roche (Switzerland)						
1986	$4,345.7	$231.1	5.3%	$293.7	$623.7	46.5
1985	3,634.3	183.6	5.1	220.2	486.3	45.5
1984	3,519.1	161.8	4.6	214.0	486.2	46.2
1983	3,576.2	156.4	4.4	216.1	473.5	45.9
BOC International (U.K.)						
1986	$2,851.3	($16.3)[f,u]	—	$347.4	$55.7	37
1985	2,462.3	142.0[v]	5.8%	312.8	46.2	36.9
1984	2,811.5	106.0[w]	3.8	322.6	56.6	38.7
1983	2,582.1	83.2[x]	3.2	468.1	40.8	39.1
Fisons (U.K.)						
1986	$1,030.2	$97.7[y]	9.5%	$ 10.4	na	10.2
1985	837.7	73.3[z]	8.8	7.4	22.7	9.0
1984	738.8	50.8[aa]	6.9	9.4	20.1	8.6
1983	554.5	38.1[bb]	6.9	4.7	21.2	7.5
Albright & Wilson (U.K.)						
1986	$955.6	$33.1	3.5%	$ 47.8	na	6.6
1985	832.1	27.8[cc]	3.3	55.7	na	6.8
1984	761.2	29.3[dd]	3.8	46.8	na	6.3
1983	865.3	31.9[ee]	3.7	37.2	na	6.3
UCB (Belgium)						
1986	$659.4	$31.5[ff]	4.8%	$ 40.2	$28.7	6.5
1985	524.3	17.0[gg]	3.2	22.9	19.5	6.4
1984	534.8	23.0[hh]	4.3	21.6	18.4	6.5
1983	572.4	22.0[ii]	3.8	23.5	17.6	6.4
Laporte Industries (U.K.)						
1986	$618.2	$60.4[jj]	9.8%	$ 33.0	na	4.1
1985	481.0	46.2[kk]	9.6	35.0	na	3.6
1984	475.4	37.3	7.8	13.5	na	3.6
1983	440.4	27.7[ll]	6.3	7.7	na	3.5

a Excludes nonrecurring loss of $63.0 million. b Excludes nonrecurring loss of $51.8 million. c Excludes nonrecurring loss of $26.7 million. d Excludes nonrecurring loss of $26.8 million. e Excludes nonrecurring minority interests' loss of $96.8 million in 1986 and $66.1 million in 1985. f Net loss. g Excludes nonrecurring gain of $17.6 million and minority interests' loss of $50.1 million. h Excludes nonrecurring minority interests' loss of $4.6 million. i Excludes nonrecurring loss of $22.4 million. j Excludes nonrecurring loss of $13.0 million. k Excludes nonrecurring loss of $17.6 million and minority interests' loss of $17.5 million. l Excludes nonrecurring gain of $6.3 million and minority interests' loss of $29.1 million. m Excludes nonrecurring gain of $9.5 million. n Excludes nonrecurring gain of $0.8 million and minority interests' loss of $22.0 million. o Excludes nonrecurring loss of $10.6 million and minority interests' loss of $6.7 million. p Excludes nonrecurring loss of $36.0 million and minority interests' loss of $3.0 million. q Excludes nonrecurring loss of $83.3 million. r Excludes nonrecurring loss of $50.5 million. s Excludes nonrecurring loss of $60.9 million. t Excludes nonrecurring loss of $25.7 million. u Excludes nonrecurring loss of $5.6 million and pretax write-off of $187.7 million. v Excludes nonrecurring loss of $9.2 million. w Excludes nonrecurring gain of $16.7 million. x Excludes nonrecurring loss of $19.4 million. y Excludes nonrecurring loss of $7.2 million. z Excludes nonrecurring loss of $3.7 million. aa Excludes nonrecurring loss of $5.6 million. bb Excludes nonrecurring loss of $10.0 million. cc Excludes nonrecurring loss of $3.5 million. dd Excludes nonrecurring loss of $0.3 million. ee Excludes nonrecurring loss of $1.5 million. ff Excludes nonrecurring loss of $2.3 million. gg Excludes nonrecurring gain of $6.2 million. hh Excludes nonrecurring gain of $0.5 million. ii Excludes nonrecurring loss of $3.0 million. jj Excludes nonrecurring gain of $7.8 million. kk Excludes nonrecurring gain of $4.1 million. ll Excludes nonrecurring loss of $3.5 million. na = not available.

NOTE ON CURRENCY CONVERSION

For monetary statistics in this section, European currencies were converted to U.S. dollars by the following conversion rates:

	$1.00 (U.S.) is equivalent to:									
	Belgium	France	Italy	Netherlands	Norway	Spain	Sweden	Switzerland	U.K.	West Germany
1986	44.67 francs	6.93 francs	1491 lire	2.45 guilders	7.39 crowns	140.05 pesetas	7.14 crowns	1.80 francs	0.682 pound	2.17 marks
1985	59.38 francs	8.99 francs	1909 lire	3.32 guilders	8.60 crowns	170.04 pesetas	8.60 crowns	2.46 francs	0.772 pound	2.94 marks
1984	57.78 francs	8.74 francs	1757 lire	3.21 guilders	8.16 crowns	160.76 pesetas	8.27 crowns	2.35 francs	0.748 pound	2.85 marks
1983	51.13 francs	7.62 francs	1519 lire	2.85 guilders	7.30 crowns	143.43 pesetas	7.67 crowns	2.10 francs	0.659 pound	2.55 marks
1982	45.69 francs	6.57 francs	1353 lire	2.67 guilders	6.45 crowns	109.86 pesetas	6.28 crowns	2.03 francs	0.571 pound	2.43 marks

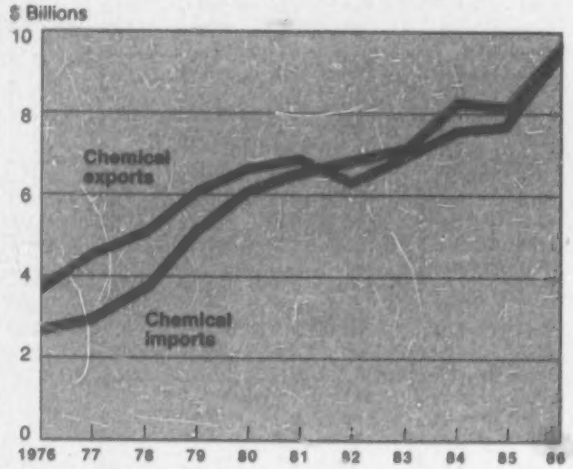
Source: International Monetary Fund

5 Foreign Chemical Industries–Japan

Last year, Japan experienced a rare downturn in its domestic economy, a slowdown that is reflected in the operating results of the country's major chemical companies. With very few exceptions, output of most volume chemicals was down. For those that did advance, the increase was modest. Only a few downstream products enabled the overall chemical production index to advance a meager 0.3% in 1986.

The chemical industry continued to trim its trade deficit, but this didn't help the industry's bottom line. In yen, sales of 10 top Japanese chemical companies dropped 14% last year. Profits slid 18%. But most of the damage was done in the first half. A better second half leads some Japanese chemical executives to believe that the worst may be over.

Chemical trade deficit shrinks slightly



Source: Ministry of International Trade & Industry

INDUSTRY TRENDS: Growth stalls

Production index, 1980 = 100	1986	1985	1984	1983	Change 1985–86
All manufacturing	121.7	122.1	116.7	104.9	0%
All chemicals	122.2	121.8	117.9	108.8	0
Inorganic chemicals and pigments	110.0	110.3	105.9	101.7	0
Alkalies and chlorine	94.4	95.9	95.2	90.7	−2
Organic chemicals	95.0	95.6	96.9	86.6	−1
Petrochemicals	114.8	114.1	113.7	98.5	1
Aromatics	111.9	112.0	106.6	96.1	0
Cyclic intermediates and dyes	118.3	117.0	116.9	105.1	1
Plastics	120.9	119.9	119.7	105.2	1
Synthetic fibers	96.6	100.6	100.2	97.1	−4
Synthetic rubber	105.1	105.8	106.1	91.6	−1
Fertilizer	71.5	76.8	79.8	77.4	−7
Textile materials	117.7	115.0	108.0	98.6	2
Medicinals and drugs	143.8	143.0	135.0	126.9	1

Source: Ministry of International Trade & Industry

PRODUCTION: Lower for many chemicals

Thousands of metric tons unless otherwise indicated	1986	1985	1984	1983	Change 1985–86
INORGANIC CHEMICALS					
Ammonia	1794	1981	2029	1881	−9%
Ammonium chloride	364	373	387	435	−2
Ammonium sulfate	1784	1837	1829	1722	−3
Calcium carbide	399	441	478	476	−9
Calcium superphosphate	514	529	559	559	−3
Carbon black	616	632	606	568	−3
Chlorine, liquid	881	926	897	818	−5
Hydrochloric acid	549	549	521	511	0
Nitrogen, millions of cu m	6293	6220	5896	5369	−2
Oxygen, millions of cu m	6786	7388	7216	6434	−8
Sodium carbonate	1022	1057	1036	1103	−3
Sodium hydroxide	3077	3075	3085	2863	0
Sodium silicate	603	594	596	588	2
Sulfuric acid	6561	6580	6458	6662	0
Titanium dioxide	223	217	205	196	3
ORGANIC CHEMICALS					
Acetaldehyde	254	271	297	255	−6
Acetic acid	300	344	350	328	−13
Acetone	228	237	246	247	−4
Acrylonitrile	546	541	523	459	1
Benzene[a]	2071	2084	2013	1750	−1
Butadiene	656	639	627	556	3
Butanol	248	258	243	229	−4
Caprolactam	448	455	436	395	−2
Cyclohexane	515	524	492	454	−2
Dioctyl phthalate	257	241	249	231	7
Ethylene	4289	4224	4390	3688	2
Ethylene dichloride	1908	1901	1939	1736	0
Ethylene glycol	339	440	429	357	−23
Ethylene oxide	489	554	533	468	−12
Methanol	221	254	280	373	−13
Octanol	235	230	246	219	2
Phenol	260	262	272	271	−1
Phthalic anhydride[a]	163	162	156	161	1
Propylene	3131	2980	2981	2658	5
Propylene glycol	223	219	205	194	2
Styrene	1417	1418	1423	1167	0
Terephthalic acid	1035	854	742	702	21
Toluene	805	803	784	831	0
Toluene diisocyanate	86	84	76	74	2
Urea	778	929	1120	980	3
Xylene	1570	1523	1401	1264	−16
PLASTICS					
Phenolic resins	313	325	334	325	−4
Polyethylene	2066	2027	2051	2027	2
Polypropylene	1333	1304	1271	1304	2
Polystyrene	1598	1599	1603	1599	0
Polyvinyl chloride	1540	1550	1504	1550	−1
SYNTHETIC RUBBER	1150	1158	1160	1002	−1

a Petroleum-based product only. Source: Ministry of International Trade & Industry

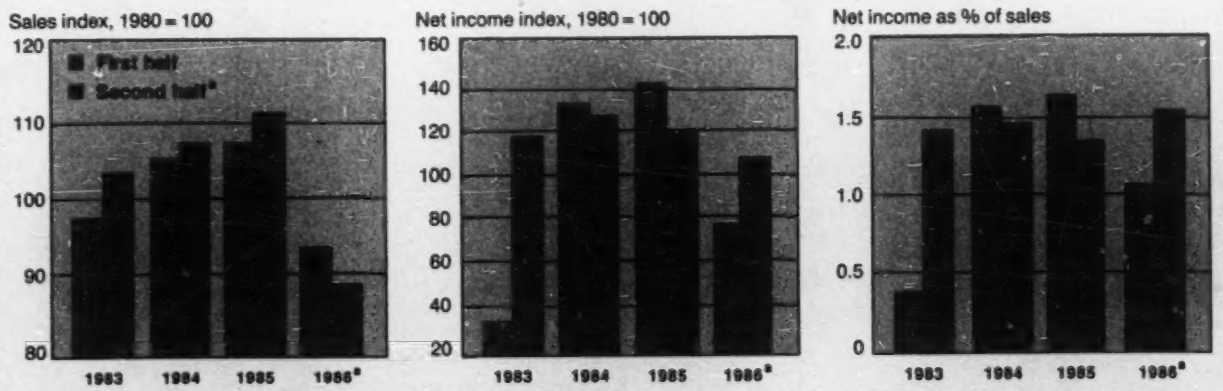
COMPANY RESULTS: Profitability little changed for chemical producers in past few years

$ Millions	Sales	Net income	Profit margin	Total assets	Employees (thousands)
Asahi Chemical Industry[a]					
1986	$4373	$83.9	1.9%	$4361	15.9
1985	3910	73.3	1.9	3661	15.9
1984	3129	57.3	1.8	3027	15.9
1983	2985	47.0	1.6	3022	16.3
Mitsubishi Chemical Industries[b]					
1986	$3774	$42.0	1.1%	$5014	8.5
1985	3963	33.1	0.8	4016	8.2
1984	3271	7.0	0.2	3211	8.3
1983	3155	0.6	0.0	3479	8.5
Toray Industries[a]					
1986	$3235	$53.9	1.7%	$3947	11.7
1985	3177	78.2	2.5	3326	12.6
1984	2563	61.4	2.4	2663	13.2
1983	2588	66.0	2.6	2576	14.1
Sumitomo Chemical[c]					
1986	$3085	$29.3	1.0%	$3949	7.6
1985	3219	38.9	1.2	3277	7.1
1984	2876	58.4	2.0	2818	6.9
1983	2783	17.3	0.6	2775	7.9
Dainippon Ink & Chemicals[a]					
1986	$2396	$33.0	1.4%	$2214	6.3
1985	2102	26.4	1.3	1722	6.2
1984	1642	20.1	1.2	1449	6.0
1983	1681	19.0	1.1	1472	6.0

$ Millions	Sales	Net income	Profit margin	Total assets	Employees (thousands)
Sekisui Chemical[a]					
1986	$2204	$30.6	1.4%	$1782	6.3
1985	1769	22.5	1.3	1439	6.2
1984	1415	16.9	1.2	1184	6.1
1983	1369	15.7	1.2	1199	6.1
Showa Denko[c]					
1986	$2116	$22.1	1.0%	$3163	4.8
1985	2066	20.1	1.0	2738	4.6
1984	1683	0.5	0.0	2069	4.6
1983	1500	(6.6)[d]	—	2086	5.0
Mitsui Toatsu Chemicals[a]					
1986	$2108	$18.0	0.9%	$2599	5.6
1985	2102	14.7	0.7	2242	5.4
1984	1672	8.6	0.5	1810	5.3
1983	1695	−14.7	d	1794	5.4
Teijin[a]					
1986	$2037	$68.9	3.4%	$2600	6.4
1985	2102	70.9	3.4	2210	7.0
1984	1766	57.3	3.2	1842	7.2
1983	1797	51.4	2.9	1846	7.1
Mitsubishi Petrochemical[c]					
1986	$1644	$25.7	1.6%	$2073	2.5
1985	2139	22.4	1.1	1939	2.4
1984	1592	43.3	2.7	1553	2.3
1983	1547	2.0	0.1	1644	2.5

Note: Monetary statistics are converted from yen to U.S. dollars on the basis of $1.00 equals: 1986, 166.9 Y; 1985, 204.6 Y; 1984, 244.6 Y; 1983, 236.7 Y. Year-to-year changes in sales, net income, and assets are affected by these fluctuations in the currency exchange rate. a Fiscal year ends March 31; 1986 data for these companies are based on actual results for the first half of the year and estimates for the second half. b Fiscal year ends Jan. 31. c Fiscal year ends Dec. 31. d Net loss. **Source:** Toyo Keizai Shinposha

Chemical sales have slumped, undercutting profits and squeezing margins



Note: Based on results of 10 leading Japanese chemical companies: Asahi Chemical Industry, Dainippon Ink & Chemicals, Mitsubishi Chemical Industries, Mitsubishi Petrochemical, Mitsui Toatsu Chemicals, Sekisui Chemical, Showa Denko, Sumitomo Chemical, Teijin, and Toray Industries. The fiscal year for most, but not all, of these companies ends March 31. a Data for second half of 1986 are estimated. **Source:** Toyo Keizai Shinposha

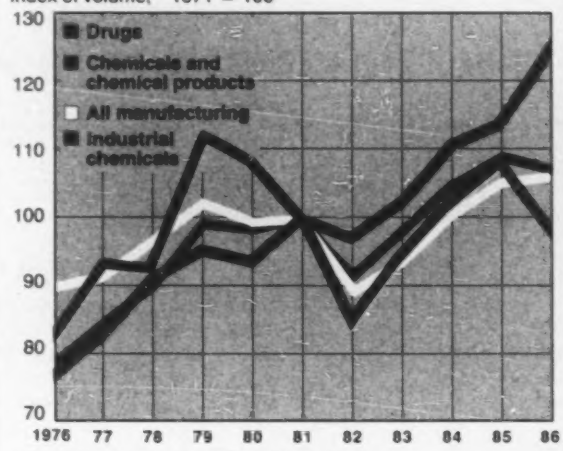
5 Foreign Chemical Industries–Canada

Canadian chemical companies came across as leaner and meaner but more profitable operations last year, as the cost-cutting measures and divestitures that many implemented during the past few years finally bore results in 1986. Despite less than glowing production statistics and weaker prices for many of their basic organic and inorganic chemicals, some major Canadian chemical companies boosted their earnings significantly. This, despite only mediocre gains in sales.

Inorganic and aromatic chemicals suffered the worst setbacks in production. The biggest improvement came in plastics, especially low-density polyethylene. Fortunately, polyethylene is one of the few large-volume products in the industry that also enjoyed a sizable price increase last year.

Note on currency conversion: Monetary statistics in this section have been converted from Canadian dollars to U.S. dollars on the basis of $1.00 U.S. equals: 1986, $0.719 Canadian; 1985, $0.734 Canadian; 1984, $0.765 Canadian; 1983, $0.804 Canadian; 1982, $0.814 Canadian.

Chemical output slips in Canada



a Gross domestic product. **Source:** Statistics Canada

COMPANY RESULTS: Profits generally higher

$ Millions (U.S.)	Sales	Net income[a]	Profit margin	Capital expenditures	Employees (thousands)
C-I-L Inc.					
1986	$927.5	$14.4	1.6%	$38.1	5.6
1985	927.8	28.6	3.1	86.6	6.3
1984	899.6	29.1	3.2	90.5	6.3
1983	895.5	19.2	2.1	87.6	6.7
Celanese Canada					
1986	$248.2	$13.5	5.5%	$ 9.0	2.1
1985	247.7	9.3	3.7	11.2	2.1
1984	263.2	4.7	1.8	9.4	2.8
1983	271.7	7.2	2.7	8.5	3.4
Du Pont Canada					
1986	$893.7	$43.4	4.9%	$67.9	4.6
1985	870.7	15.1	1.7	52.4	4.9
1984	895.5	31.5	3.5	34.6	5.0
1983	897.6	28.3	3.2	20.3	5.0
Polysar					
1986	$1473.6	$20.0	1.4%	$78.2	6.5
1985[b]	1371.1	0.1	—	42.8	6.7
1984	1083.4	27.5	2.5	43.8	6.0
1983	1074.9	7.0	0.7	115.9	6.0
Union Carbide Canada					
1986	$258.1	$14.5	5.6%	$29.7	3.3
1985	264.8	11.7	4.4	16.4	3.8
1984	300.3	9.0	3.0	15.0	4.1
1983	311.2	6.4	2.1	41.5	4.2

a Excludes extraordinary gains and losses. b Acquired shares of Petrosar formerly held by Du Pont Canada and Union Carbide Canada.

PRODUCTION: A poor year for inorganics

Thousands of metric tons	1986	1985	1984	1983	Change 1985–86
INORGANIC CHEMICALS					
Ammonia	3540	3620	3493	2888	−2%
Ammonium nitrate	948	1075	1035	934	−12
Ammonium phosphate	1149	1301	1383	1259	−12
Carbon black	154	173	177	na	−11
Chlorine	1536	1424	1424	1385	8
Hydrochloric acid	153	158	161	170	−3
Nitric acid	1024	1128	1100	1061	−9
Phosphoric acid, 100% P_2O_5	547	629	691	656	−13
Sodium chlorate	373	336	313	294	11
Sodium hydroxide	1696	1589	1574	1528	7
Sulfuric acid	3536	3890	4043	3686	−9
ORGANIC CHEMICALS					
Acetone	na	23	25	25	—
Benzene	635	691	549	580	−8
Butadiene	146	132	127	133	11
Butylene	142	133	129	138	7
Ethylene	1909	1745	1464	1196	9
Formaldehyde	117	na	97	90	—
Methanol	na	na	1872	1671	—
Propylene	628	647	656	715	−3
Toluene	393	472	395	411	−17
Urea	2330	2033	2162	1445	15
Xylenes	356	415	406	426	−14
PLASTICS					
Polyesters, unsaturated	37	36	34	26	3
Polyethylene, high density	242	229	227	211	6
Polyethylene, low density	887	733	529	412	21
Polystyrene[a]	186	178	171	na	4
Polyvinyl chloride	na	na	252	243	—

a Includes acrylonitrile-butadiene-styrene resins. na = not available. **Source:** Statistics Canada

SHIPMENTS: Industrial chemicals hit a snag in the mid-1980s

$ Millions (U.S.)	1986	1985	1984	1983	1982	1981
All manufacturing	$179,420	$179,177	$174,373	$163,192	$152,551	$160,747
Chemicals and chemical products	13,066	12,898	12,821	12,613	11,573	11,118
Industrial chemicals, inorganic	2,565	2,639	2,683	2,556	2,343	1,848
Industrial chemicals, organic	2,725	2,833	2,966	3,102	2,947	2,699
Plastics and synthetic resins	1,396	1,317	1,331	1,302	1,126	1,275
Pharmaceuticals and medicinals	1,664	1,536	1,468	1,336	1,187	1,119
Adhesives	111	98	94	92	64	na
Paint and varnish	951	881	815	784	667	742
Soaps and cleansers	1,038	1,028	962	940	902	860
Toilet preparations	640	626	614	597	542	497
Agricultural chemicals	278	291	272	287	158	na
Printing ink	209	184	183	172	149	179
Miscellaneous	1,325	1,292	1,258	1,274	1,317	1,526
Synthetic fibers	586	563	568	607	485	na

na = not available. **Source:** Statistics Canada

CHEMICAL IMPORTS: Moderately higher

$ Millions (U.S.)	1986	1985	1984	1983
Inorganic chemicals	$ 378	$ 374	$ 381	$ 330
Organic chemicals	1162	1107	1120	1019
Fertilizers and fertilizer materials	143	152	158	148
Synthetic and reclaimed rubber	169	160	158	129
Plastic materials	702	651	644	604
Plastic film and sheet	306	278	253	215
Other plastic shapes and forms	233	214	202	146
Dyes, except dyeing intermediates	58	49	56	62
Pigments, lakes, and toners	94	78	77	65
Paints and related products	133	127	113	89
Other chemical products	820	807	824	724
TOTAL	**$4198**	**$3997**	**$3986**	**$3531**
Imports from U.S.	**$3145**	**$3034**	**$3114**	**$2754**
U.S. share, %	**75%**	**76%**	**78%**	**78%**

Source: Statistics Canada

CHEMICAL EXPORTS: Not much change

$ Millions (U.S.)	1986	1985	1984	1983
Chemical elements	$ 172	$ 158	$ 174	$ 150
Other inorganic chemicals	881	828	797	631
Organic chemicals	819	995	992	966
Fertilizers and fertilizer materials	815	946	1171	933
Synthetic rubber and plastic materials	629	587	481	419
Plastics, basic shapes and forms	327	238	203	159
Other chemical products	290	236	236	229
TOTAL	**$3933**	**$3988**	**$4054**	**$3487**
Exports to U.S.	**$2625**	**$2669**	**$2663**	**$2286**
U.S. share, %	**67%**	**67%**	**66%**	**66%**

Source: Statistics Canada

TRADE BALANCE: Surplus narrows markedly

$ Billions (U.S.)	1986	1985	1984	1983	1982
Total exports	$83.8	$85.3	$83.8	$71.1	$66.6
Total imports	81.3	77.1	73.2	60.6	55.3
Trade balance	2.5	8.2	10.6	10.3	11.3

Chemical trade falls into unwelcome deficit

$ Millions (U.S.)	1986	1985	1984	1983	1982
Chemical exports	$3933	$3988	$4054	$3487	$3284
Chemical imports	4198	3997	3986	3531	2919
Chemical trade balance	−265	−9	68	−44	365

Source: Statistics Canada

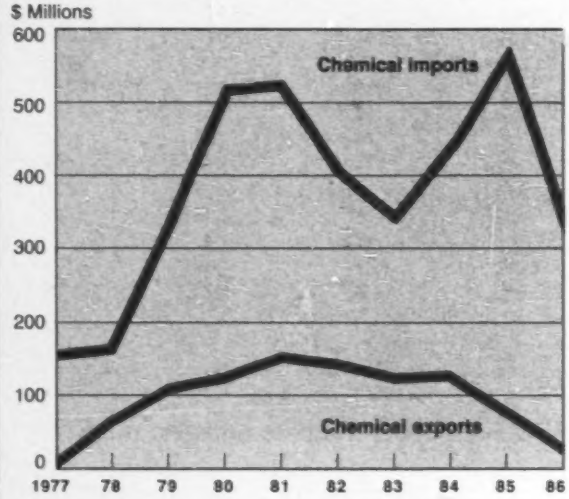
PRICES: Specialties rise, basics drop

Price index, 1981 = 100	1986	1985	1984	Change 1984–85
All commodities	119.6	118.6	115.4	1%
Chemicals and chemical products	116.1	114.5	113.1	1
Inorganic industrial chemicals	113.5	114.5	112.5	−1
Sulfuric acid	125.2	121.7	119.3	3
Chlorine	128.5	130.1	124.6	−1
Organic industrial chemicals	90.2	94.5	100.3	−5
Benzene-toluene-xylene	68.9	94.0	89.6	−27
Olefins	77.1	83.5	95.4	−8
Synthetic resins	110.4	109.4	111.4	−1
Polyethylene[a]	96.5	90.8	99.0	6
Polystyrene	93.9	93.6	101.5	0
Thermosets	108.3	115.1	113.2	−6
Synthetic fibers	100.1	101.2	101.5	−1
Pharmaceuticals	150.0	141.5	131.5	6
Paint and varnish	129.0	121.6	116.3	6
Soaps and cleansers	123.4	119.1	115.2	4
Toilet preparations	145.8	140.9	135.3	3
Agricultural chemicals	111.4	111.9	107.6	0
Pigments, lakes, and toners	119.6	115.0	112.2	4
Fertilizers, mixed	97.2	100.4	102.0	−3
Inks	111.4	110.4	108.8	1

a Includes both high and low density. **Source:** Statistics Canada

5 Foreign Chemical Industries–Mexico

Imports slump but trade deficit stays wide



Note: Trade in primary petrochemicals only; does not include secondary chemicals.
Source: Petróleos Mexicanos

DOMESTIC SALES: Many chemicals slump

Thousands of metric tons[a]	1986	1985	1984	1983	Change 1985–86
Acetaldehyde	150	199	212	200	−25%
Acrylonitrile	91	96	84	86	−5
Ammonia, anhydrous	1857	1804	1670	1455	3
Benzene	13	17	12	11	−24
Butadiene	68	110	106	84	−38
Cyclohexane	55	62	50	51	−11
Dodecylbenzene	102	100	101	107	2
Ethylene oxide	109	118	112	105	−8
Hexane	37	48	50	47	−23
Isopropyl alcohol	42	61	58	54	−31
Methanol	176	176	162	140	0
Polyethylene, high density	119	134	136	120	−11
Polyethylene, low density	282	266	222	251	6
Styrene	123	140	125	116	−12
Sulfur	462	457	455	319	1
Toluene	90	97	85	81	−7
Vinyl chloride	261	275	259	206	−5
o-Xylene	43	38	32	33	13
p-Xylene	226	268	263	131	−16

a Domestic sales by Petróleos Mexicanos (Pemex) of primary petrochemicals. **Source:** Pemex

CHEMICAL IMPORTS: Mexico cuts way back

Thousands of metric tons[a]	1986	1985	1984	1983	Change 1985–86
Acetaldehyde	26	70	70	42	−63%
Acrylonitrile	36	50	34	28	−28
Ammonia	13	39	0	0	−67
Butadiene	44	97	67	45	−55
Cyclohexane	19	33	26	3	−42
Dichloroethane	0	0	57	25	—
Dodecylbenzene	5	39	49	55	−87
Ethylbenzene	0	6	16	6	—
Ethylene oxide	2	48	11	0	−96
Isopropyl alcohol	26	50	44	25	−48
Perchloroethylene	15	14	15	9	7
Polyethylene, high density	82	42	19	49	95
Polyethylene, low density	76	127	63	88	−40
Propylene	26	26	26	17	—
Propylene tetramer	47	19	12	6	147
Styrene	49	112	93	66	−56
Toluene	47	43	37	0	9
Vinyl chloride	100	162	109	75	−38
o-Xylene	7	9	0	7	−22
p-Xylene	114	179	119	25	−36
TOTAL	748	1168	869	582	−37%

a Imports by Petróleos Mexicanos (Pemex) of primary petrochemicals. **Source:** Pemex

PRODUCTION: Huge gains for a few products

Thousands of metric tons[a]	1986	1985	1984	1983	Change 1985–86
Acetaldehyde	136	145	147	153	−6%
Acrylonitrile	54	49	49	55	10
Ammonia, anhydrous	1949	2261	2156	2355	−14
Benzene	222	178	156	139	25
Butadiene	18	18	20	18	0
Cyclohexane	39	32	30	49	22
Cumene	42	39	33	37	8
Dichloroethane	271	193	220	265	40
Dodecylbenzene	103	61	51	57	69
Ethane	2550	1905	1574	1638	34
Ethylbenzene	91	46	31	24	100
Ethylene	767	670	643	645	14
Ethylene oxide	114	71	97	112	61
Hexane	101	98	95	64	3
Hydrochloric acid	83	63	77	79	32
Isopropyl alcohol	11	14	14	12	−21
Methanol	182	192	197	206	−5
Nitrogen	49	46	47	45	7
Oxygen	206	211	200	214	−2
Polyethylene, high density	69	67	76	82	3
Polyethylene, low density	242	160	134	88	51
Propylene	232	207	208	191	12
Propylene tetramer	51	31	35	30	65
Styrene	69	33	30	24	109
Sulfur, recovered	456	475	461	377	−4
Toluene	238	220	216	223	8
Vinyl chloride	141	108	132	134	31
m- and *p*-Xylene	231	247	225	197	−6
o-Xylene	42	44	43	39	−5

a Production of Petróleos Mexicanos (Pemex) of primary petrochemicals. **Source:** Pemex

In 1986, overall industrial output in East Europe and the Soviet Union rose nearly 5%, racking up the largest increase since 1978. Growth varied from not quite 2% in Hungary to 5% in the U.S.S.R.

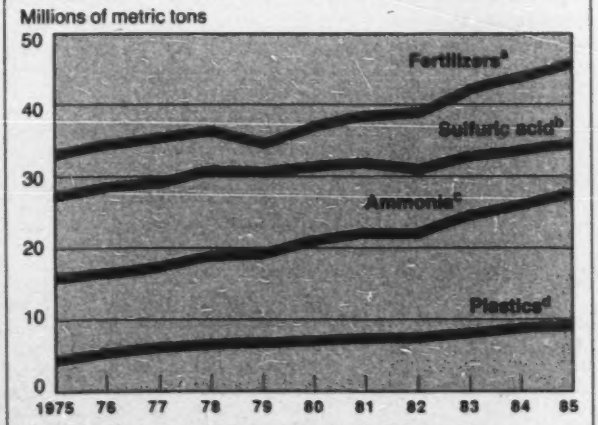
Most nations of the region also stepped up chemical production. Several recorded higher growth for chemicals than for industry as a whole. Romania led, claiming growth of 7.7% for all industry and 8.3% for chemicals. However, western experts discount its data as unrealistically high. Soviet chemical production rose 7%, twice the growth registered in 1985.

MAN-MADE FIBERS: Production edges higher in Soviet-bloc countries

Production, thousands of metric tons	1985	1984	1983	1982	Change 1984–85
NONCELLULOSIC FIBERS[a]					
Bulgaria	70	64	60	52	9%
Czechoslovakia	110	101	90	89	9
East Germany	161	154	151	144	4
Hungary	26	22	21	20	19
Poland	171	166	161	135	3
Romania	186	170	158	153	9
U.S.S.R.	692	664	622	588	4
TOTAL	1414	1341	1262	1180	5%
CELLULOSIC FIBERS					
Bulgaria	42	41	39	38	1%
Czechoslovakia	60	59	58	55	2
East Germany	176	170	165	162	4
Hungary	7	7	6	8	0
Poland	80	76	69	64	7
Romania	62	60	60	58	4
U.S.S.R.	662	652	645	635	2
TOTAL	1090	1084	1042	1020	2%

a Excludes olefins and textile glass. Source: Textile Economics Bureau

Production of important chemical products continues to expand in Eastern Europe



Note: Data for U.S.S.R., Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania. a As N, P_2O_5, and K_2O. b 100% H_2SO_4. c Nitrogen content. d Including resins for man-made fibers in U.S.S.R. Sources: Central Intelligence Agency, official national statistics from state central statistical bureaus

PRODUCTION GROWTH: Pace quickens

% annual change in gross output	1986	1985	1984	1983	1982
U.S.S.R. and East Europe					
All industry	4.8%	3.9%	4.3%	4.3%	2.4%
Bulgaria					
All industry	4.3	3.2	4.2	4.3	4.6
Chemicals	5.1	3.6	8.2	5.9	6.6
Czechoslovakia					
All industry	3.1	3.5	4.0	2.8	1.1
Chemicals	4.3	5.1	4.5	3.3	1.1
East Germany					
All industry[a]	4.3	4.4	4.2	4.1	3.1
Chemicals	4.8	3.7	4.3	2.9	4.8
Hungary					
All industry	1.8	0.7	3.2	1.2	2.5
Chemicals[b]	1.3	1.0	4.0	1.6	1.5
Poland					
All industry	4.4	4.5	5.2	6.4	−2.1
Chemicals	4.4	3.0	5.0	8.2	0.1
Romania					
All industry	7.7	4.9	6.7	4.7	1.1
Chemicals	8.3	0.3	8.1	5.4	1.5
U.S.S.R.					
All industry[c]	4.9	3.9	4.1	4.2	2.9
Chemicals[c]	7.0	3.4	5.2	5.9	3.0
All industry[d]	na	2.8[e]	2.5	2.6	0.8
Chemicals[d]	na	5.2[e]	3.5	6.9	2.1

a Industrial commodity production. b For state and cooperative industry only. c Figures based on official Soviet statistics. d Figures based on Central Intelligence Agency estimates, giving lower results because of postulated upward bias in official figures. e Preliminary figure. na = not available. Sources: United Nations Economic Commission for Europe and state central statistical bureaus; Central Intelligence Agency

AGRICULTURAL CHEMICALS: Soviet Union increases availability of fertilizers

Thousands of metric tons	1986	1985	1984	1983	1982
Bulgaria					
Fertilizer supply[a]	na	865	938	1,009	1,038
Pesticide supply[b]	na	na	35.6	33.9	40.4
Czechoslovakia					
Fertilizer supply[a]	na	1,734	1,749	1,776	1,741
East Germany					
Fertilizer supply[a]	na	1,639	1,565	1,451	1,408
Pesticide supply[b]	na	26.7	26.0	26.0	26.7
Hungary					
Fertilizer supply[a]	na	1,338	1,524	1,586	1,528
Poland					
Fertilizer supply[a]	3,483	3,280	3,424	3,182	3,346
Pesticide supply[b]	14.4	12.4	11.1	14.7	16.3
Romania					
Fertilizer supply[a]	1,600[c]	1,374	1,289	1,373	1,409
U.S.S.R.					
Fertilizer supply[a]	28,500[c]	25,395	23,080	22,977	20,152
Nitrogen[a]	11,800[c]	10,950	10,279	10,302	9,038
Phosphate[a,d]	8,991[c]	7,615	6,625	6,465	6,115
Potassium[a]	7,700[c]	6,822	6,167	6,201	4,991

a Nutrient content basis, as N, P_2O_5, or K_2O. b On basis of active substance. c Estimated. d Includes ground phosphate rock. na = not available. Sources: Department of Agriculture, official national statistics from state central statistical bureaus

PRODUCTION: Moderate growth continues for several major chemical products

Thousands of metric tons, unless otherwise noted	1986[a]	1985	1984	1983	1982
U.S.S.R.					
Sulfuric acid, 100%	27,900	26,000	25,338	24,714	23,801
Mineral fertilizers[b]	34,700	33,194	30,808	29,733	26,738
Nitrogen[b]	14,770	14,223	13,328	13,014	11,593
Phosphate[b,c]	9,176	8,596	7,695	7,417	7,057
Potassium[b]	10,745	10,367	9,776	9,294	8,079
Synthetic ammonia[d]	na	19,100	17,677	16,904	14,605
Plastics[e]	5,300	5,010	4,819	4,419	4,058
Sodium hydroxide, 100%	3,200	3,056	2,972	2,853	2,783
Synthetic rubber[f]	na	2,005	1,955	1,812	1,795
Pesticides[g]	332	348	343	332	316
Rubber tires[h]	66,000	65,200	63,700	62,000	61,700
(thousands of units)					
BULGARIA					
Sulfuric acid, 100%	806	810	908	861	916
Mineral fertilizers[b]	673	640	690	687	698
Nitrogen[b]	541	469	479	483	459
Phosphate[b]	132	172	211	204	239
Synthetic ammonia[d]	na	1,138	1,138	1,124	1,033
Plastics	na	406	430	398	337
Sodium hydroxide, 100%	144	157	170	147	155
Synthetic rubber	na	26	26	25	25
Pesticides[g]	na	18	20	21	20
CZECHOSLOVAKIA					
Sulfuric acid, 100%	1,292	1,297	1,246	1,244	1,252
Mineral fertilizers[b]	na	1,204	1,190	1,175	1,166
Nitrogen[b]	na	582	576	591	568
Phosphate[b,c]	na	407	398	378	387
Potassium[b,g]	na	215	216	206	211
Synthetic ammonia[d]	na	818	827	809	725
Plastics	1,140	1,103	1,039	1,002	956
Sodium hydroxide, 100%	na	330	325	330	324
Synthetic rubber	na	70	71	67	66
Pesticides[g]	na	19	17	16	16
EAST GERMANY					
Sulfuric acid, 100%	na	882	885	926	920
Mineral fertilizers[b]	na	4,843	4,733	4,714	4,669
Nitrogen[b]	na	1,078	959	968	948
Phosphate[b,c]	na	299	308	315	286
Potassium[b]	na	3,465	3,465	3,431	3,434

Thousands of metric tons, unless otherwise noted	1986[a]	1985	1984	1983	1982
Synthetic ammonia[d]	na	1210	1207	1210	1167
Plastics	na	1048	1057	1045	990
Sodium hydroxide, 100%	na	667	694	687	695
Synthetic rubber	na	140	152	155	155
Pesticides[g]	na	60	58	54	53
Rubber tires[h]	na	8364	7784	7380	7051
(thousands of units)					
HUNGARY					
Sulfuric acid, 100%	543	520	549	606	571
Mineral fertilizers[b]	1040	1066	1100	1110	1071
Nitrogen[b]	na	685	675	685	660
Phosphate[b]	na	253	286	285	269
Potassium[b,i]	na	130	139	140	142
Synthetic ammonia[d]	na	790	813	812	791
Plastics	423	389	385	345	326
Sodium hydroxide, 100%[j]	202	194	194	192	178
Rubber tires[h]	na	825	794	735	735
(thousands of units)					
POLAND					
Sulfuric acid, 100%	2969	2863	2769	2786	2676
Mineral fertilizers[b]	2526	2270	2356	2324	2284
Nitrogen[b]	1445	1254	1369	1341	1298
Phosphate[b]	948	889	869	872	868
Potassium[b,i]	133	127	118	111	118
Synthetic ammonia[d]	na	1490	1499	1430	1384
Plastics	631	603	601	535	451
Sodium hydroxide, 100%	na	384	379	392	363
Ethylene	na	261	256	198	175
Synthetic rubber	116	126	119	120	100
Rubber tires[h]	8409	8541	8103	6695	5322
(thousands of units)					
ROMANIA					
Sulfuric acid, 100%	na	1835	1915	1941	1600
Mineral fertilizers[b]	na	3097	3073	2913	2692
Nitrogen[b]	na	2197	2212	2091	2008
Synthetic ammonia[d]	na	2876	2857	2723	2583
Plastics	na	628	655	633	591
Sodium hydroxide, 100%	na	814	805	745	760
Synthetic rubber	173	156	156	147	160
Pesticides[g]	na	53	53	48	45
Rubber tires[h]	na	7210	5882	5346	5445
(thousands of units)					

a Approximate figures or estimates. b Nutrient content basis, as N, P_2O_5, or K_2O. c Including production of ground phosphate rock for direct applications and phosphate animal feeds. d Nitrogen content. e Including resins for man-made fibers. f Estimated. g On basis of active substance. h For all motor vehicle tires, excluding aircraft and bicycle tires. i Imported potash added to domestically produced nitrogen and phosphate to form multinutrient fertilizer. j Including regenerated NaOH. na = not available. **Sources:** Central Intelligence Agency, Department of Agriculture, Wharton Econometric Forecasting Associates, official national statistics from state central statistical bureaus

SOVIET FOREIGN TRADE: Rebound in exports brings a wider overall surplus

$ Millions	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Exports[a]	$97,096[b]	$86,956	$91,492	$91,652	$87,168	$79,377	$76,437	$64,912	$52,435	$45,227	$37,269
Imports[a]	88,921[b]	82,922	80,355	80,440	77,846	73,158	68,473	57,958	50,798	40,926	38,212
Trade balance	8,175[b]	4,034	11,137	11,212	9,322	6,219	7,964	6,954	1,637	4,301	−943
Chemical exports[a]	na	na	2,804	2,422	2,309	2,380	2,139	1,606	1,284	1,063	939
Chemical imports[a]	na	na	4,223	4,070	3,886	4,031	3,732	2,803	2,188	1,850	1,668
Chemical trade balance	na	na	−1,419	−1,648	−1,577	−1,651	−1,593	−1,197	−904	−787	−729

a Free on board. b Approximate values. na = not available. **Sources:** Central Intelligence Agency, Wharton Econometric Forecasting Associates, based on official Soviet statistics and exchange rates

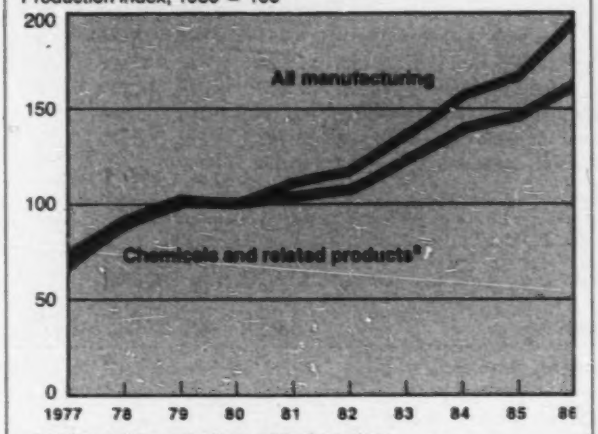
SOUTH KOREA

INDUSTRY TRENDS: Strong growth in 1986

Index, 1980 = 100	1986	1985	1984	1983	Change 1985–86
Chemicals, petroleum, coal, rubber, and plastic products					
Production	164.7	146.6	140.7	123.7	12%
Shipments	152.5	138.1	132.6	119.5	10
Inventories	139.3	132.4	125.2	119.5	5
Industrial chemicals					
Production	142.6	129.4	126.4	116.0	10
Shipments	156.2	141.5	134.4	124.5	10
Inventories	128.6	137.0	117.3	114.2	−6
Other chemical products					
Production	189.7	171.7	160.8	141.7	10
Shipments	186.8	168.6	158.7	139.2	11
Inventories	192.0	183.8	159.3	141.6	5
Rubber products					
Production	184.2	158.1	158.4	120.3	17
Shipments	184.1	158.4	158.2	120.1	16
Inventories	141.9	139.4	138.2	99.8	2
Plastic products					
Production	173.2	153.6	145.3	124.2	13
Shipments	173.7	154.7	146.1	123.6	12
Inventories	159.5	130.6	139.9	132.0	22
All manufacturing					
Production	199.4	167.1	160.6	139.0	19
Shipments	188.9	160.6	153.6	135.8	18
Inventories	147.7	150.3	138.0	126.0	−2

Source: Bureau of Statistics of the Korean Economic Planning Board

Industrial growth in South Korea regains a faster pace



a Includes petroleum, coal, rubber, and plastics products.
Source: Bureau of Statistics of Korean Economic Planning Board

FOREIGN TRADE: Chemical imports surge

$ Millions	1986	1985	1984	1983
Exports[a]	$34,714	$30,283	$29,245	$24,445
Imports[b]	31,584	31,136	30,631	26,192
Trade balance	3,130	−853	−1,386	−1,747
Chemical exports	1,068	936	845	677
Chemical imports	3,495	2,789	2,709	2,242
Chemical trade balance	−2,427	−1,853	−1,864	−1,565

a Free on board. b Includes cost, insurance, freight. **Source:** Korean Office of Customs Administration

PRODUCTION: Plastics make good gains

Thousands of metric tons	1986	1985	1984	1983	Change 1985–86
Sulfuric acid	1898	2028	1975	1610	−6%
Complex fertilizers	1863	1944	1861	1614	−4
Urea fertilizers	812	839	858	737	−3
Ammonia	519	538	565	523	−3
Ethylene	534	562	526	491	−5
Polyvinyl chloride	473	411	344	323	15
Polyethylene	385	353	317	279	9
Polyester fibers	320	291	265	217	10
Sodium carbonate	264	251	248	231	5
Sodium hydroxide	251	229	215	202	10
Benzene	301	216	171	159	40
Polystyrene	248	134	132	123	85
Polypropylene	263	259	219	195	2

Source: Bureau of Statistics of the Korean Economic Planning Board

AUSTRALIA

PRODUCTION: Major chemicals slump

Thousands of metric tons	1986[a]	1985[a]	1984[a]	1983	Change 1985–86
Chemicals					
Hydrochloric acid, 100%	54	58	57	60	−6%
Nitric acid, 100%	193	200	189	189	−4
Sulfuric acid, 100%	1788	1773	1726	1782	1
Ammonium sulfate	205	243	217	200	−16
Superphosphate[b]	2479	2586	2663	2986	−4
Plastics and resins	880	na	815	720	na
Synthetic detergents	239	226	228	220	6
Unsupported plastics film, sheeting	162	157	139	na	3
Polyethylene[c]	120	118	108	na	2
Polyvinyl chloride[d]	15	14	14	17	7

a Year ending June 30. b Includes double and triple superphosphates and ammonium phosphate expressed in terms of single phosphate (22% P_2O_5 equivalent). c Low and high density. d Including copolymers. na = not available. **Source:** Australian Bureau of Statistics

FOREIGN TRADE: Imports outpace exports

$ Millions	1986[a]	1985[a]	1984[a]	1983[a]
Exports[b,c]	$22,990	$23,104	$21,804	$20,184
Imports[d]	24,305	22,591	21,374	19,960
Trade balance	−1,315	513	430	224
Chemical exports[b,c]	413	422	455	431
Medicinal products	103	95	108	102
Chemical imports[d]	2,119	1,982	1,959	1,671
Organic chemicals	537	523	554	441
Resins, plastic materials	476	441	441	343
Medicinal products	275	228	201	182
Chemical trade balance	−1,706	−1,560	−1,504	−1,240

a Year ending June 30. b Free on board. c Includes re-exports. d Values for customs purposes, free-on-board basis. **Source:** Australian Bureau of Statistics

CHINA

PRODUCTION: Up for major chemicals nearly across the board

Thousands of metric tons, unless otherwise noted	1986	1985	1984	1983	Change 1985–86
Fertilizer[a]	14,258	13,222	14,602	13,789	8%
Nitrogen (N)	na	11,438	12,210	11,094	na
Phosphate (P_2O_5)[b]	na	1,760	2,360	2,666	na
Potash (K_2O)	na	24	32	29	na
Synthetic ammonia	17,195	17,212	18,374	16,771	0
Sulfuric acid, 100%	7,510	6,764	8,172	8,696	11
Sodium hydroxide	2,458	2,347	2,222	2,123	5
Sodium carbonate	2,150	2,011	1,880	1,793	7
Calcium carbide	na	1,953	1,846	1,808	na
Plastics	1,283	1,208	1,180	1,121	6%
Man-made fibers	1,016	945	735	541	8
Synthetic detergents	na	1,005	810	677	na
Ethylene	642	651	648	654	−1
Pesticides	223	211	299	331	6
Pharmaceuticals	107	na	54	48	na
Rubber tires[c]	19,932	18,527	15,690	12,710	8

a Nutrient content. b Including production of ground phosphate rock for direct application and phosphate animal feeds. c In thousands of units, not including wheelbarrow and bicycle tires. na = not available. **Source:** State Statistical Bureau of the People's Republic of China

CHEMICAL IMPORTS: Generally higher

$ Millions[a]	1985	1984	1983	Change 1984–85
Organic chemicals	$ 698	$ 591	$ 492	18%
Inorganic chemicals	321	278	266	16
Dyeing, tanning, coloring materials	141	78	69	81
Medicinal and pharmaceutical products	103	71	49	45
Essential oils, perfumes, cleansing materials	26	12	8	116
Fertilizers[b]	1481	1616	1395	−8
Explosives, pyrotechnic products	2	0.4	0.2	297
Plastic materials, resins, cellulose esters and ethers	1449	1116	612	30
Other chemical materials	254	329	287	−23
TOTAL	$4476	$4091	$3177	9%

a Includes cost, insurance, and freight. b Manufactured. **Source:** General Administration of Customs of the People's Republic of China

CHEMICAL EXPORTS: Continued growth

$ Millions[a]	1985	1984	1983	Change 1984–85
Organic chemicals	$ 314	$ 281	$ 303	11%
Inorganic chemicals	291	275	262	6
Dyeing, tanning, coloring materials	78	72	79	9
Medicinal and pharmaceutical products	302	262	268	15
Essential oils, perfumes, cleansing materials	111	113	104	−1
Fertilizers[b]	2	0.3	2	501
Explosives, pyrotechnic products	114	161	68	−29
Plastic materials, resins, cellulose esters and ethers	42	42	45	1
Other chemical materials	123	102	117	21
TOTAL	$1377	$1309	$1249	5%

a Free on board. b Manufactured. **Source:** General Administration of Customs of the People's Republic of China

TAIWAN

INDUSTRY TRENDS: Strong gains last year

Industrial production indexes, 1981 = 100	1986	1985	1984	1983	Change 1985–86
All manufacturing	155.0	133.5	132.0	117.0	16%
Chemical materials	179.0	149.0	139.6	115.4	20
Basic chemicals	143.7	125.7	118.6	107.1	14
Petrochemicals	170.6	154.7	144.8	114.3	10
Fertilizers	85.8	65.6	75.2	74.0	31
Synthetic fibers	185.2	146.7	136.6	117.8	26
Plastics and resins	212.3	164.6	153.1	123.8	29
Chemical products	178.2	153.7	141.8	125.2	16

Source: Taiwan Ministry of Economic Affairs

FOREIGN TRADE: Chemical deficit widens

$ Millions	1986	1985	1984	1983
Exports[a]	$39,789[b]	$30,723	$30,456	$25,123
Imports[c]	24,165[b]	20,102	21,959	20,287
Trade balance	15,624[b]	10,621	8,497	4,836
Chemical exports[a,d]	1,487	1,340	1,244	1,044
Chemical imports[b,d]	4,161	2,966	3,203	2,815
Chemical trade balance	−2,674	−1,626	−1,959	−1,771

a Free on board. b Estimated. c Includes cost, insurance, and freight. d Includes chemicals and chemical products, but does not include plastic and rubber products. **Sources:** Taiwan Council for Economic Planning & Development, C&EN estimates

PRODUCTION: Some chemicals up sharply

Thousands of metric tons, unless otherwise noted	1986	1985	1984	1983	Change 1985–86
Man-made fibers	1359	1112	970	840	22%
Sulfuric acid	815	733	762	678	11
Polyvinyl chloride	795	633	634	522	26
Ethylene	868	792	660	499	10
Vinyl chloride	668	511	492	458	31
Ammonium sulfate	604	507	434	381	19
Ammonia, anhydrous	323	252	327	378	28
Sodium hydroxide	366	387	351	295	−5
Xylene	237	270	291	219	−12
Compound fertilizer	302	249	301	275	21
Propylene	441	415	341	250	6
Hydrochloric acid	256	228	241	212	12
Benzene	285	285	249	144	0
Urea	214	139	179	171	54
Calcium superphosphate	248	132	177	159	88
Ethylene glycol	222	199	189	151	12
Oxygen[a]	506	347	198	125	46
Polyethylene[b]	398	350	270	190	14
Paints	184	130	123	108	41

a Millions of cubic meters. b High and low density. **Sources:** Taiwan Council for Economic Planning & Development, Petrochemical Industry Association of Taiwan, *Petrochemical Industry Journal* (Taiwan)